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Newfoundland East and Southeast Coast Herring – An Assessment of Stocks to the Spring of 2004

Hareng des côtes est et sud-est de Terre-Neuve - Évaluation des stocks jusqu'au printemps 2004

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ABSTRACT

Results of an assessment from 2002 to the spring of 2004 are presented for four herring stocks along the east and southeast coasts of Newfoundland. Commercial landings increased from 4800 t in 2002 to 5800 t in 2003. However, TAC's were not taken in any area due to poor market conditions and price. Spring spawners dominated commercial landings, however, less so than in the 1980's and early 1990's. The 1999 year class dominated in all areas except Fortune Bay where the 1996 year class was dominant. Four series of abundance indices were available for each of the stock areas: research gill net catch rates, commercial gill net catch rates, and gill net and purse seine fisher observations. No acoustic biomass estimates were available due to the discontinuation of these surveys. The methodology to describe stock status was similar to the last assessment in 2002. Current status and future prospects were summarized for each area in a performance report. These reports were based upon a standardized interpretation of abundance indices, biological characteristics, and ecological considerations. The precautionary approach was implemented for the first time by quantifying levels of concern in relation to mean research gill net catch rates. Retrospective performance reports were also prepared. For White Bay – Notre Dame Bay and Bonavista Bay – Trinity Bay, current status has improved since the last assessment but abundance is still at a low level. The status of the St. Mary's Bay – Placentia Bay and Fortune Bay stocks has deteriorated since 2002. The precautionary approach indicated low or no risk of serious harm to any of the stocks.

RÉSUMÉ

Nous présentons les résultats de l'analyse des données recueillies sur quatre stocks de hareng des côtes est et sud-est de Terre-Neuve de 2002 au printemps 2004. Les débarquements commerciaux sont passés de 4 800 t en 2002 à 5 800 t en 2003. Cependant, les TAC n'ont été atteints dans aucun secteur en raison des mauvaises conditions du marché et de la faiblesse des prix. Les prises commerciales ont été dominées par les géniteurs printaniers, mais moins que dans les années 1980 et au début des années 1990. La classe d'âge de 1999 a dominé les prises dans tous les secteurs, sauf celui de la baie Fortune, où la classe d'âge de 1996 a dominé. Pour chaque zone de stock, quatre séries d'indices d'abondance étaient disponibles, soit les taux de capture scientifique au filet maillant, les taux de capture commerciale au filet maillant et les observations faites par les pêcheurs au filet maillant et à la senne. Aucune estimation de la biomasse par relevé acoustique n'était disponible en raison de l'interruption des relevés de ce type. La méthode utilisée pour décrire l'état des stocks est semblable à celle utilisée lors de la dernière évaluation (en 2002). L'état actuel et les perspectives des stocks dans chaque zone sont résumés dans un rapport de performance. Chacun de ces rapports est fondé sur l'interprétation normalisée des indices d'abondance, des caractéristiques biologiques et des considérations écologiques. L'approche de précaution a été mise en œuvre pour la première fois en quantifiant le niveau de préoccupation par rapport aux taux moyens de capture scientifique au filet maillant. Des rapports de performance rétrospectifs ont également été préparés. L'état des stocks des baies White et Notre Dame et des baies Bonavista et Trinity s'est amélioré depuis la dernière évaluation, mais leur abondance demeure faible. L'état des stocks des baies St. Mary's et Placentia et de la baie Fortune s'est détérioré depuis 2002. L'approche de précaution a indiqué un risque faible ou nul de dommages graves pour chacun des stocks.

INTRODUCTION

There are five coastal herring stocks in east and southeast Newfoundland (Figure 1): White Bay - Notre Dame Bay (WB-NDB), Bonavista Bay - Trinity Bay (BB-TB), Conception Bay - Southern Shore (CB-SS), St. Mary's Bay - Placentia Bay (SMB-PB), and Fortune Bay (FB). This document provides an assessment of four of these stocks to the spring of 2004; CB-SS was excluded due to a lack of scientific data.

In recent years, these stocks have been assessed bi-annually, most recently in the fall of 2002 (Wheeler et al. 2003). Current assessment data sources were similar to those in 2002, except there were no acoustic biomass estimates due to the elimination of these surveys. The assessment methodology was also similar and included performance reports on the current status and future prospects of each stock. Retrospective performance reports were also prepared back to 1998; all reports were standardized for inter-annual comparisons. The precautionary approach was also implemented by quantifying levels of concern in relation to mean research gill net catch rates.

This document is divided into several sections. The first section examines commercial fishery data and the biological sampling used to calculate 2002 and 2003 commercial landings at age. The second section examines abundance indices including research gill net catch rates, commercial gill net catch rates, and gill net and purse seine fisher observations. The third section examines biological and ecological data. The document concludes with performance reports on the current status and future prospects of each stock.

Section 1.0 - Description of the 2002 and 2003 Commercial Fisheries and Landings at Age

1.1 Commercial Landings and Biological Sampling

Policy and Economics Branch provides commercial landings data (t), by bay, month and gear type (Tables 1 – 5). Data for recent years are considered preliminary, as statistics have not yet been finalized. Commercial statistics since 1996 are not inclusive, as they do not include landings for bait purposes.

Biological samples, collected each year from the commercial herring fisheries, provide age distributions of the commercial landings. In 2002, 950 herring were sampled and aged to calculate numbers at age for 4800 t of landings (Table 6). In 2003, 850 herring were sampled and aged to calculate numbers at age for 5800 t of landings (Table 7).

1.2 The 2002 Fishery

TAC's for the 2002 fishery were unchanged from 2001 for all areas (Table 1). Landings increased from 3000 t in 2001 to 4800 t in 2002; 4800 t represented approximately 51% of the overall TAC (Tables 2 - 5 and Figure 2).

In WB-NDB, landings increased from 26 t in 2001 to 358 t in 2002; 33% of the TAC was taken in 2002 (Table 2). The 1999 year class accounted for 29% of landing numbers, followed by the 1995 year class at 26% (Table 8 and Figure 3). The age distribution was extensive, as five year classes each accounted for greater than 5% of the landings. Spring spawners accounted for 77% of landings, a decrease of 18% from 2001.

In BB-TB, landings increased from 486 t in 2001 to 566 t in 2002; 16% of the TAC was taken in 2002 (Table 3). The 1999 year class accounted for 23% of landing numbers, followed by the 1998 year class at 22% (Table 9 and Figure 3). The age distribution was extensive, as six year classes each accounted for greater than 5% of the landings. Spring spawners accounted for 57% of landings, an increase of 4% from 2001.

In SMB-PB, landings increased from 702 t in 2001 to 1568 t in 2002; 78% of the TAC was taken in 2002 (Table 4). Fish aged 11+ accounted for 30% of landing numbers, followed by the 1996 year class at 29% (Table 10 and Figure 3). The age distribution was truncated, as only four year classes each accounted for greater than 5% of the landings. Spring spawners accounted for 66% of landings, the same as in 2001.

In FB, landings increased from 1782 t in 2001 to 2259 t in 2002; 84% of the TAC was taken in 2002 (Table 5). The 1996 year class accounted for 46% of landing numbers, followed by fish aged 11+ at 42% (Table 11 and Figure 3). The age distribution was truncated, as only two year classes each accounted for greater than 5% of the landings. Spring spawners accounted for 99% of landings, an increase of 11% from 2001.

1.3 The 2003 Fishery

Prior to the 2003 fishery, Fisheries Management Branch formulated a new two year (2003 and 2004) integrated management plan for east and southeast Newfoundland herring. TAC's decreased from 2002 to 2003 in BB-TB, increased in SMB-PB and FB, and remained the same in WB-NDB (Table 1). Landings increased from 4800 t in 2002 to 5800 t in 2003; 5800 t represented approximately 63% of the overall TAC (Tables 2 - 5 and Figure 2).

In WB-NDB, landings decreased from 358 t in 2002 to 332 t in 2003; 30% of the TAC was taken in 2002 (Table 2). The 1999 year class accounted for 49% of

landing numbers, followed by the 1998 year class at 30% (Table 8 and Figure 3). The age distribution was truncated, as only four year classes each accounted for greater than 5% of the landings and there were no fish older than age 9 in the landings. Spring spawners accounted for 58% of landings, a decrease of 19% from 2002.

In BB-TB, landings increased from 566 t in 2002 to 1029 t in 2003; 34% of the TAC was taken in 2003 (Table 3). The 1999 year class accounted for 46% of landing numbers, followed by the 2000 year class at 17% (Table 9 and Figure 3). The age distribution was extensive, as five year classes each accounted for greater than 5% of the landings. Spring spawners accounted for 66% of landings, an increase of 13% from 2002.

In SMB-PB, landings decreased from 1568 t in 2002 to 1084t in 2003; 43% of the TAC was taken in 2003 (Table 4). The 1996 year class accounted for 40% of landing numbers, followed by fish aged 11+ at 15% (Table 10 and Figure 3). The age distribution was truncated, as only four year classes each accounted for greater than 5% of the landings. Spring spawners accounted for 54% of landings, a decrease of 12% from 2002.

In FB, landings increased from 2259 t in 2002 to 3392 t in 2003; 92% of the TAC was taken in 2003 (Table 5). The 1996 year class accounted for 51% of landing numbers, followed by fish aged 11+ at 25% (Table 11 and Figure 3). The age distribution was truncated, as only three year classes each accounted for greater than 5% of the landings. Spring spawners accounted for 82% of landings, a decrease of 19% from 2002.

Section 2.0 - Abundance Indices

2.1 Research Gill Net Program

This program, initiated in 1982, provides age disaggregated abundance indices independent of the commercial fishery. There is a seventeen year time series for WB-NDB and BB-TB, and twenty-three years for SMB-PB and FB. Each year, commercial fishers are contracted to provide catch rate data and biological samples of their catch. In 2004, twenty-seven fishers participated in the program (Table 12 and Figure 4), eight in WB-NDB, nine in BB-TB, six in SMB-PB and four in FB. This represented a decrease of two fishers from 2003.

Catch rates at age for spring spawning herring (numbers per nights fished) were available up to and including 2003 (Table 13 and Figure 5). Catch rates only were available for 2004, as biological samples were not processed in time for the assessment.

In WB-NDB, catch rates increased by 340% from 2002 to 2004, with the recruitment of the 1999 year class. 2004 catch rates were below average, 27% of the long-term mean (1988 – 2004).

In BB-TB, catch rates increased by 527% from 2002 to 2004, with the recruitment of the 1999 year class. 2004 catch rates were marginally above average, 107% of the long-term mean (1988 – 2004).

In SMB-PB, catch rates decreased by 68% from 2002 to 2004, with the decline of the 1996 year class and fish aged 11+. 2004 catch rates were below average, 68% of the long-term mean (1982 – 2004).

In FB, catch rates decreased by 44% from 2002 to 2004, possibly due to the poor recruitment of the 1999 year class. 2004 catch rates were below average, 42% of the long-term mean (1982 – 2004).

2.2 Commercial Gill Net Logbook Program

This program, initiated in 1996, provides a time series of catch per unit effort (CPUE) data from the commercial fixed gear fishery. The logbook, described in Wheeler et al. (1999), is designed to be completed by gill net fishers in the spring commercial (food fish) fishery, spring bait (lobster) fishery, and/or fall commercial fishery. In 2004, logbooks were sent to approximately 2800 licensed fishers. However, it is uncertain how many of these fishers actively fished herring in 2004. The number of logbooks returned was low (< 20) and, depending upon the area fished, most returns were from winter / spring / early summer fisheries (Table 14). Logbooks from fall fisheries were limited in number and were not included in the analysis. All logbooks received to October 2004 were included.

In WB-NDB, logbook returns decreased from 8 in 2002 to 6 in 2004 (Table 14). Effort (net nights per fisher) also decreased by 47%, and was substantially lower in 2004 than for the research gill net program (Figure 6). Documented effort in 2004 was restricted primarily to the eastern portion of Notre Dame Bay (Figure 7) from late April to late June. Catch rates (kilograms per standard net per nights fished) increased by 1118% from 2002 to 2004 (Figure 8) and are currently 107% of the long-term average (1996 – 2004). Fishers indicated (on a ten point scale) that herring abundance was higher in 2004 than in 2002 but was still below average (Figure 8). They also indicated that spawning intensity was similar in 2004 to 2002, but at a very low level (Figure 8).

In BB-TB, logbook returns decreased from 10 in 2002 to 3 in 2004 (Table 14). Effort (net nights per fisher) also decreased by 43%, and was substantially lower in 2004 than for the research gill net program (Figure 6). Documented effort in 2004 was restricted to the northern part of Bonavista Bay and the eastern side of Trinity Bay (Figure 7) from late April to late June. Catch rates (kilograms per

standard net per nights fished) decreased by 9% from 2002 to 2004 (Figure 9) and are currently 36% of the long-term average (1996 – 2004). Fishers indicated (on a ten point scale) that herring abundance was higher in 2004 than in 2002 but was still below average (Figure 9). They also indicated that spawning intensity was lower in 2004 than in 2002, and at a very low level (Figure 9).

In SMB-PB, logbook returns decreased from 4 in 2002 to 2 in 2004 (Table 14). Effort (net nights per fisher) also decreased by 80%, and was substantially lower in 2004 than for the research gill net program (Figure 6). Documented effort in 2004 was restricted to the inner part of Placentia Bay (Figure 7) from early April to mid June. Catch rates (kilograms per standard net per nights fished) decreased by 86% from 2002 to 2004 (Figure 10) and are currently 28% of the long-term average (1996 – 2004). Fishers indicated (on a ten point scale) that herring abundance was lower in 2004 than in 2002 and was below average (Figure 10). They also indicated that spawning intensity was lower in 2004 than in 2002, and at a very low level (Figure 10).

In FB, logbook returns decreased from 7 in 2002 to 5 in 2004 (Table 14). Effort (net nights per fisher) also decreased by 33%, and was similar in 2004 to that for the research gill net program (Figure 6). Documented effort in 2004 was distributed throughout the bay (Figure 7) from early April to late June. Catch rates (kilograms per standard net per nights fished) decreased by 51% from 2002 to 2004 (Figure 11) and are currently 55% of the long-term average (1996 – 2004). Fishers indicated (on a ten point scale) that herring abundance was lower in 2004 than in 2002 and was below average (Figure 11). They also indicated that spawning intensity was lower in 2004 than in 2002, and below average (Figure 11).

In FB, and to a lesser extent in SMB-PB, annual total logbook catches are consistently greater than the reported annual total commercial gill net landings (Figure 12), indicating that commercial landings data are under-estimated in these areas.

2.3 Commercial Purse Seine Questionnaire

This program, initiated in 1996, provides a quantitative evaluation of biological and fishery related information from herring purse seine fishers. Each year, all active fishers are contacted by phone after the fishery and asked to answer a series of standardized questions. Response rates are high for most areas and years; in 2003 10 of 15 fishers responded to the survey (Table 15). For WB-NDB and BB-TB, where there is a fall fishery only, survey results were available to 2003. For SMB-PB, where there is a winter / spring fishery, survey results were available to 2004. There is no purse seine fishery in FB.

For WB-NDB, 4 of 4 active fishers responded to the questionnaire in 2003 (Table 15). All who responded fished in November and December (Figure 13),

primarily around Fogo Island (Figure 14). Total landings were 201 t. The estimate of discarding was 193 t, of which 40% was estimated to have survived. This resulted in a high ratio (1.60) of removals to landings. The level of discards was considered to be higher than in 2002 (Figure 15) and the reasons given for discarding were 'gear damage' and 'quota restrictions' (Figure 16). Fishers indicated (on a ten point scale) that herring abundance was higher in 2003 than in 2002 and above average (Figure 17). They also indicated that abundance in 2003 was higher than when they first fished herring.

For BB-TB, 2 of 2 active fishers responded to the questionnaire in 2003 (Table 15). Both fished from October to December (Figure 13), in the northern part of Bonavista Bay (Figure 14). Total landings were 378 t. The estimate of discarding was 25 t, of which 20% was estimated to have survived. This resulted in a low ratio (1.10) of removals to landings. The level of discards was considered to be the same as in 2002 (Figure 15) and the only reason given for discarding was 'quota restrictions' (Figure 16). Fishers indicated (on a ten point scale) that herring abundance was lower in 2003 than in 2002 but still above average (Figure 17). However, they also indicated that abundance in 2003 was higher than when they first fished herring.

For SMB-PB, 10 of 11 active fishers responded to the questionnaire in 2004 (Table 15). All who responded fished in March (Figure 13), on the eastern side of Placentia Bay and/or St. Mary's Bay (Figure 14). Total landings were 1272 t. The estimate of discarding was 2 t, all of which was estimated to have survived. This resulted in the lowest possible ratio (1.00) of removals to landings. The level of discards was considered to be lower than in 2002 (Figure 15) and no reasons were given for discarding. Fishers indicated (on a ten point scale) that herring abundance was lower in 2004 than in 2002 but still above average (Figure 17). However, they also indicated that abundance in 2004 was higher than when they first fished herring.

In most areas and years, total landings from the questionnaires are equal to or less than the commercial landings data. However, in several instances (BB-TB: 1996, 1997, 1999, 2003 and SMB-PB: 1996, 1997, 2002, 2004) landings reported from questionnaires were substantially higher than from commercial landings data (Figure 18). This, plus information from discard rates and survival of discards, indicates that total removals, as represented by commercial landings data, are often underestimated.

Section 3.0 – Biological and Ecological Data

Age distributions of herring (by number) were available from the research gill net program up to and including 2003 (Figure 19); biological samples from 2004 were not processed in time for this assessment.

In WB-NDB, the 1999 year class accounted for 61% of the 2003 catch numbers, followed by the 1997 year class at 6%. The age distribution was extensive as five year classes each accounted for greater than 5% of the catch. However, there were very few fish older than age 8. Spring spawners accounted for 82% of the catch, a decrease of 8% from 2003.

In BB-TB, the 1999 year class accounted for 67% of the catch numbers, followed by the 1998 year class at 24%. The age distribution was extensive as six year classes each accounted for greater than 5% of the catch. Fish aged 11+ also accounted for 10% of the catch. Spring spawners accounted for 67% of the catch, a decrease of 18% from 2003.

In SMB-PB, the 1999 year class accounted for 62% of the catch numbers, followed by the 1998 year class at 9%. The age distribution was extensive as five year classes each accounted for greater than 5% of the catch. Fish aged 11+ also accounted for 7% of the catch. Spring spawners accounted for 77% of the catch, an increase of 12% from 2003.

In FB, the 1996 year class accounted for 49% of the catch numbers, followed by fish aged 11+ at 36%. This was the only area in which the 1999 year class did not dominate. The age distribution was truncated as only three year classes each accounted for greater than 5% of the catch. However, fish aged 11+ did contribute strongly to the catch. Spring spawners accounted for 86% of the catch, an increase of 3% from 2003.

Estimates of relative year class size were derived from mean research gill net catch rates at ages four, five, and six to 2003 (Figure 20). For SMB-PB and FB the time series included the 1976 to 1999 year classes. For WB-NDB and BB-TB it included the 1982 to 1999 year classes. In all areas, four of six mature year classes (1993 to 1998) were at or below average strength. The 1999 year class (at age 4 in 2003) is the most recent recruiting year class that can be estimated. It was above average in strength in all areas. All year classes in this time series are considered to be weak in relation to the strong year classes of the late 1960's (Wheeler et al. 2001).

The mean weight of herring (ages 4 to 10) decreased all areas during the 1980's and 1990's (Figure 21). In recent years, this trend has been reversed in WB-NDB and BB-TB. However, the mean weight in 2003 was still below average in all areas, 88% to 96% of the long-term mean (1983 – 2003).

Reduced growth rates have impacted the commercial fishery. The minimum legal size for commercial herring is 290 mm (total length). Through the 1980's, herring at age 4 were greater than 290 mm (Figure 22). However, through the 1990's and up to 2003, herring at age 4 were below

the minimum legal size, and in some areas and years, age 5 fish were only marginally greater than 290 mm.

Good survival of young herring (i.e. recruitment) through the 1960's to 1980's was largely influenced by suitable environmental conditions, principally warm over-wintering water temperatures and high salinities prior to spawning (Winters and Wheeler 1987). Ocean temperatures and salinities in the early to mid 1990's were below average. However, since the late 1990's ocean temperatures in coastal Newfoundland waters have been warmer (Figure 23). In 2003, the mean temperature at 20 m off St. John's (Station 27) was 22% above the long-term mean (1983 – 2003). Similarly, within the past few years, salinities have also increased (Figure 23). In 2003, the mean salinity at 20 m off St. John's (Station 27) was 1% above the long-term mean (1983 – 2003).

Section 4.0 – Stock Status

4.1 Methodology

As in the 2002 assessment (Wheeler et al. 2003), performance reports, including evaluation of abundance indices and biological characteristics, were used to assess current status and prospects of each stock (Tables 20 – 23). Retrospective reports were prepared for 1998 and 2000 and all reports were standardized for inter-annual comparisons. The precautionary approach was also implemented by quantifying levels of concern in relation to mean research gill net catch rates.

Performance reports were based upon the traffic light method (Caddy 1998) and included evaluation of abundance indices, biological characteristics, and ecological considerations. The traffic light method uses a system of red (-), yellow (?), and green (+) lights to categorize indicators as 'cause for concern', 'uncertain', or 'positive'. In this assessment, 'uncertain' was defined as 'uncertainty of an interpretation' rather than precautionary uncertainty. However, a measure of precautionary uncertainty was also included in each report.

Four series of abundance indices were evaluated for each stock including: research gill net catch rates, commercial gill net catch rates, gill net fisher observations, and purse seine fisher observations. Purse seine fisher observations were not available for Fortune Bay, as there is no purse seine fishery in the area.

Biological characteristics, including age compositions, mean weights (ages 4 to 10), and year class sizes were evaluated. Ecological considerations included the potential effects of changes in water temperature and salinity on recruitment. Information on the consumption of herring by seals, to 2002, was also incorporated (Wheeler et al. 2003).

Current stock status was described based upon a standardized evaluation of all abundance indices and age composition of mature age groups (Table 17). Research gill net age compositions were considered to best represent population age structure. Abundance indices and age composition data were weighted based upon their perceived importance and reliability in assessing current status. Future prospects were described by evaluating the strength of mature year classes and of the 1999 recruiting year class, as estimated from research gill net catch rates at age (Table 17). The calculation of standardized and weighted performance report indices (Table 18 and Figure 24) allowed for inter-annual comparisons from 1998 to 2004.

The Precautionary Approach concept was introduced this year and a limit reference point was proposed to delineate situations which could result in serious harm to the stocks. Precautionary uncertainty was evaluated by measuring the current year research gill net catch rate in relation to the long-term mean (Table 19). Research gill net catch rates were used in this evaluation as they are the longest time series available and provide a proxy for abundance.

4.2 White Bay – Notre Dame Bay

4.2.1 The Fishery

Landings decreased from 358 t in 2002 to 332 t in 2003; 30% of the TAC was taken in 2003 (Table 2). In addition to reported landings, since 1996 an unknown amount of herring (considered to be less than 500 t) is caught annually in the gill net bait fishery. Mortality from discards in the 2003 fall purse seine fishery was estimated by fishers to be approximately 115 t (Table 15).

Documented effort has declined since the 1980's. Purse seine effort in the fall fishery (sets per fisher) decreased by 90% from 1997 to 2003 (Table 15). Gill net effort (net nights fished per fisher) in the spring fishery decreased by 87% from 1996 to 2004 (Table 14).

The 2003 purse seine fishery, in November and December, was entirely in the Fogo Island area (Figure 14). The 2004 gill net fishery, from late April to late June, was mostly in eastern Notre Dame Bay (Figure 7).

4.2.2 Abundance Indices

Research gill net catch rates (number of fish per nights fished) increased by 340% from 2002 to 2004 but are currently still at a low level, 27% of the long-term mean (Figure 5). This suggests that current abundance is below average and increasing.

Commercial gill net catch rates (kilograms per standard net per nights fished) increased by 1118% from 2002 to 2004 and are currently 107% of the long-term mean (Figure 8). This suggests that current abundance is average and increasing.

Gill net fishers indicated (on a ten point scale) that herring abundance was higher in 2004 than in 2002 but still below average (Figure 8); this suggests that current abundance is below average and increasing.

Purse seine fishers indicated (on a ten point scale) that herring abundance was higher in 2003 than in 2002 and above average (Figure 17); this suggests that abundance in 2003 was high and increasing.

4.2.3 Biological Characteristics

The age composition from the 2003 research gill net catch was dominated by the 1999 year class which accounted for 61% of the catch (Figure 19). The age distribution was considered stable as five year classes each accounted for greater than 5% of the catch. However, there were very few fish older than age 8 and little evidence of recruiting year classes since 1999.

Based on research gill net catch rates of year classes since 1982, four of six current mature year classes (1983 to 1998) are below average strength (Figure 20). The 1999 recruiting year class is above average in strength. However, all year classes in this time series are considered to be weak in relation to the strong year classes of the late 1960's.

Mean weight (ages 4 to 10) decreased during the 1980's and 1990's but has exhibited an increasing trend in recent years (Figure 21). However, the mean weight in 2003 was still below average, 89% of the long-term mean. This can potentially lead to an increase in fishing mortality per tonne of fish caught.

4.2.4 Ecological Considerations

Ocean temperatures and salinities in the early to mid 1990's were below average. However, since the late 1990's ocean temperatures and salinities in coastal Newfoundland waters have increased. In 2003, the mean annual water temperature at 20 m off St. John's was 22% above the long-term mean (Figure 23). Similarly, the salinity was 1% above the mean. Recent higher temperatures and salinities may enhance recruitment (Winters and Wheeler 1987).

4.2.5 Current Stock Status

All abundance indices show that this stock has increased since 2002 but is still at a very low level. The spawning stock is dominated by one age group; however, the population age structure is considered to be stable as five year classes each account for greater than 5% of the catch.

The mean weight of fish has decreased since the 1980's and is still below average; this may have resulted in increased fishing mortality per tonne of catch.

Stock status has improved since the last assessment in 2002 but abundance is still considered to be low.

4.2.6 Stock Outlook

Most mature year classes in the population are below average and considered to be weak. However, the 1999 year class is above average in strength relative to year classes within the past two decades.

Recruitment has been shown to be positively influenced by warm over-wintering temperatures and high salinities during the over-wintering period prior to spawning. Recent water temperatures and salinities, which have been above average relative to the last two decades, may enhance recruitment.

4.2.7 Level of Concern (Precautionary Approach)

Current research gill net catch rates are 27% of the long-term mean. This implies very low risk of serious harm. If catch rates were to drop below 10% of the mean, the level of concern would be increased.

4.3 Bonavista Bay – Trinity Bay

4.3.1 The Fishery

Landings increased from 566 t in 2002 to 1029 t in 2003; 34% of the TAC was taken in 2003 (Table 3). In addition to reported landings, since 1996 an unknown amount of herring (considered to be less than 300 t) is caught annually in the gill net bait fishery. Mortality from discards in the 2003 fall purse seine fishery was estimated by fishers to be approximately 20 t (Table 15).

Documented effort has declined since the 1980's. Purse seine effort in the fall fishery (sets per fisher) decreased by 46% from 2001 to 2003 (Table 15). Gill

net effort (net nights fished per fisher) in the spring fishery decreased by 85% from 1996 to 2004 (Table 14).

The 2003 purse seine fishery, in October through December, was concentrated in the northern part of Bonavista Bay (Figure 14). The 2004 gill net fishery, from mid April to late June, was distributed throughout both bays (Figure 7).

4.3.2 Abundance Indices

Research gill net catch rates (number of fish per nights fished) increased by 527% from 2002 to 2004 and are currently 107% of the long-term mean (Figure 5). This suggests that current abundance is average and increasing.

Commercial gill net catch rates (kilograms per standard net per nights fished) decreased by 9% from 2002 to 2004 and are currently 36% of the long-term mean (Figure 9). This suggests that current abundance is below average and decreasing.

Gill net fishers indicated (on a ten point scale) that herring abundance was higher in 2004 than in 2002 but still below average (Figure 9); this suggests that current abundance is below average and increasing.

Purse seine fishers indicated (on a ten point scale) that herring abundance was lower in 2003 than in 2002 but still above average (Figure 17); this suggests that abundance in 2003 was above average and decreasing.

4.3.3 Biological Characteristics

The age composition from the 2003 research gill net catch was dominated by the 1999 year class which accounted for 67% of the catch (Figure 19). The age distribution was considered stable as six year classes each accounted for greater than 5% of the catch. Fish aged 11+ also accounted for 10% of the catch. There was little evidence of recruiting year classes since 1999.

Based on research gill net catch rates of year classes since 1982, four of six current mature year classes (1983 to 1998) are below average strength (Figure 20). The 1999 recruiting year class is well above average in strength. However, all year classes in this time series are considered to be weak in relation to the strong year classes of the late 1960's.

Mean weight (ages 4 to 10) decreased during the 1980's and 1990's but has exhibited an increasing trend in recent years (Figure 21). However, the mean

weight in 2003 was still below average, 96% of the long-term mean. This can potentially lead to an increase in fishing mortality per tonne of fish caught.

4.3.4 Ecological Considerations

Ocean temperatures and salinities in the early to mid 1990's were below average. However, since the late 1990's ocean temperatures and salinities in coastal Newfoundland waters have increased. In 2003, the mean annual water temperature at 20 m off St. John's was 22% above the long-term mean (Figure 23). Similarly, the salinity was 1% above the mean. Recent higher temperatures and salinities may enhance recruitment (Winters and Wheeler 1987).

4.3.5 Current Stock Status

Research gill net catch rates and commercial gill net fisher observations show that this stock has increased since 2002 but is still at a low level. The spawning stock is dominated by one age group; however, the population age structure is considered to be stable as six year classes each account for greater than 5% of the catch.

The mean weight of fish has decreased since the 1980's and is still below average; this may have resulted in increased fishing mortality per tonne of catch.

Stock status has improved since the last assessment in 2002 but abundance is still considered to be low.

4.3.6 Stock Outlook

Most mature year classes in the population are below average and considered to be weak. However, the 1999 year class is well above average in strength relative to year classes within the past two decades.

Recruitment has been shown to be positively influenced by warm over-wintering temperatures and high salinities during the over-wintering period prior to spawning. Recent water temperatures and salinities, which have been above average relative to the last two decades, may enhance recruitment.

4.3.7 Level of Concern (Precautionary Approach)

Current research gill net catch rates are 107% of the long-term mean. This implies no risk of serious harm.

4.4 St. Mary's Bay – Placentia Bay

4.4.1 The Fishery

Landings decreased from 1568 t in 2002 to 1084 t in 2003; 43% of the TAC was taken in 2003 (Table 4). In addition to reported landings, since 1996 an unknown amount of herring (considered to be less than 150 t) is caught annually in the gill net bait fishery. Fishers reported minimal discard mortality in the 2004 winter/spring purse seine fishery (Table 15).

Documented effort increased from the 1980's to the 1990's. Purse seine effort (sets per fisher) peaked in 1997 and has since decreased by 59% from 1997 to 2004 (Table 15). Gill net effort (net nights fished per fisher) peaked in 1998 and has since decreased by 94% from 1998 to 2004 (Table 14).

The purse seine fishery, in March 2004, was concentrated along the eastern sides of Placentia and St. Mary's Bay (Figure 14). The 2004 gill net fishery, from early April to mid June, was mostly in Placentia Bay (Figure 7).

4.4.2 Abundance Indices

Research gill net catch rates (number of fish per nights fished) decreased by 68% from 2002 to 2004 and are currently 68% of the long-term mean (Figure 5). This suggests that current abundance is below average and decreasing.

Commercial gill net catch rates (kilograms per standard net per nights fished) decreased by 86% from 2002 to 2004 and are currently 28% of the long-term mean (Figure 10). This suggests that current abundance is below average and decreasing.

Gill net fishers indicated (on a ten point scale) that herring abundance was lower in 2004 than in 2002 and below average (Figure 10); this suggests that current abundance is below average and decreasing.

Purse seine fishers indicated (on a ten point scale) that herring abundance was lower in 2004 than in 2002 but still above average (Figure 17); this suggests that current abundance is above average and decreasing.

4.4.3 Biological Characteristics

The age composition from the 2003 research gill net catch was dominated by the 1999 year class which accounted for 62% of the catch (Figure 19). The age distribution was considered stable as five year classes each accounted for greater

than 5% of the catch. Fish aged 11+ also accounted for 7% of the catch. There was little evidence of recruiting year classes since 1999.

Based on research gill net catch rates of year classes since 1976, three of six current mature year classes (1983 to 1998) are below average strength (Figure 20). The 1999 recruiting year class is well above average in strength. However, all year classes in this time series are considered to be weak in relation to the strong year classes of the late 1960's.

Mean weight (ages 4 to 10) has exhibited a decreasing trend since the early 1980's (Figure 21). The mean weight in 2003 was below average, 89% of the long-term mean. This can potentially lead to an increase in fishing mortality per tonne of fish caught.

4.4.4 Ecological Considerations

Ocean temperatures and salinities in the early to mid 1990's were below average. However, since the late 1990's ocean temperatures and salinities in coastal Newfoundland waters have increased. In 2003, the mean annual water temperature at 20 m off St. John's was 22% above the long-term mean (Figure 23). Similarly, the salinity was 1% above the mean. Recent higher temperatures and salinities may enhance recruitment (Winters and Wheeler 1987).

4.4.5 Current Stock Status

All abundance indices show that this stock has decreased since 2002. The spawning stock is dominated by one age group; however, the population age structure is considered to be stable as five year classes each account for greater than 5% of the catch.

The mean weight of fish has decreased since the 1980's and is still below average; this may have resulted in increased fishing mortality per tonne of catch.

Stock status has deteriorated since the last assessment in 2002.

4.4.6 Stock Outlook

Most mature year classes in the population are at or below average and are considered to be weak. However, the 1999 year class is well above average in strength relative to year classes within the past two decades.

Recruitment has been shown to be positively influenced by warm over-wintering temperatures and high salinities during the over-wintering period prior to

spawning. Recent water temperatures and salinities, which have been above average relative to the last two decades, may enhance recruitment.

4.4.7 Level of Concern (Precautionary Approach)

Current research gill net catch rates are 68% of the long-term mean. This implies no risk of serious harm.

4.5 Fortune Bay

4.5.1 The Fishery

Landings increased from 2259 t in 2002 to 3392 t in 2003; 92% of the TAC was taken in 2003 (Table 5). In addition to reported landings, since 1996 an unknown amount of herring (considered to be less than 400 t) is caught annually in the gill net bait fishery.

Documented effort in the 1980's and 1990's was very low. Gill net effort (net nights fished per fisher) peaked in 1997 and has since decreased by 88% from 1997 to 2004 (Table 14).

In recent years, most landings have been by bar seine. During the spring of 2004, this fishery was concentrated in the Long Harbour area. The 2004 gill net fishery, from late March to mid June, was distributed throughout the bay (Figure 7). There is no purse seine fishery in Fortune Bay.

4.5.2 Abundance Indices

Research gill net catch rates (number of fish per nights fished) decreased by 44% from 2002 to 2004 and are currently 42% of the long-term mean (Figure 5). This suggests that current abundance is below average and decreasing.

Commercial gill net catch rates (kilograms per standard net per nights fished) decreased by 51% from 2002 to 2004 and are currently 28% of the long-term mean (Figure 11). This suggests that current abundance is below average and decreasing.

Gill net fishers indicated (on a ten point scale) that herring abundance was lower in 2004 than in 2002 and below average (Figure 11); this suggests that current abundance is below average and decreasing.

Purse seine fishers indicated (on a ten point scale) that herring abundance was lower in 2004 than in 2002 and below average (Figure 17); this suggests that current abundance is below average and decreasing.

4.5.3 Biological Characteristics

The age composition from the 2003 research gill net catch was dominated by the 1996 year class which accounted for 49% of the catch (Figure 19). The age distribution was truncated as only three year classes each accounted for greater than 5% of the catch. However, fish aged 11+ also accounted for 36% of the catch. There was little evidence of recruiting year classes since 1999.

Based on research gill net catch rates of year classes since 1976, three of six current mature year classes (1983 to 1998) are below average strength (Figure 20). The 1999 recruiting year class is above average in strength. However, all year classes in this time series are considered to be weak in relation to the strong year classes of the late 1960's.

Mean weight (ages 4 to 10) has exhibited a decreasing trend since the early 1980's (Figure 21). The mean weight in 2003 was below average, 88% of the long-term mean. This can potentially lead to an increase in fishing mortality per tonne of fish caught.

4.5.4 Ecological Considerations

Ocean temperatures and salinities in the early to mid 1990's were below average. However, since the late 1990's ocean temperatures and salinities in coastal Newfoundland waters have increased. In 2003, the mean annual water temperature at 20 m off St. John's was 22% above the long-term mean (Figure 23). Similarly, the salinity was 1% above the mean. Recent higher temperatures and salinities may enhance recruitment (Winters and Wheeler 1987).

4.5.5 Current Stock Status

All abundance indices show that this stock has decreased since 2002. The spawning stock is dominated by one age group. The population age structure is truncated as only three year classes each account for greater than 5% of the catch. However, fish aged 11+ accounted for 36% of the catch.

The mean weight of fish has decreased since the 1980's and is still below average; this may have resulted in increased fishing mortality per tonne of catch.

Stock status has deteriorated since the last assessment in 2002.

4.5.6 Stock Outlook

Most mature year classes in the population are at or below average and are considered to be weak. However, the 1999 year class is above average in strength relative to year classes within the past two decades.

Recruitment has been shown to be positively influenced by warm over-wintering temperatures and high salinities during the over-wintering period prior to spawning. Recent water temperatures and salinities, which have been above average relative to the last two decades, may enhance recruitment.

4.5.7 Level of Concern (Precautionary Approach)

Current research gill net catch rates are 43% of the long-term mean. This implies no risk of serious harm.

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Table 1. Landings and TAC's ('000 t) of east and southeast Newfoundland herring, by stock area, 1979 – 2004.

	WB-NDB		BB-TB		SMB-PB		FB	
Year	Catch	TAC	Catch	TAC	Catch	TAC	Catch	TAC
1979	15.7	11.5	9.8	8.4	3.6	3.4	1.2	1.0
1980	6.5	5.3	5.4	4.4	2.5	2.5	0.5	1.0
1981	4.7	5.3	4.0	4.8	0.6	1.2	0.1	0.2
1982	2.0	1.2	0.5	0.7	0.1	0.0	0.1	0.0
1983	0.4	0.0	0.1	0.0	0.1	0.0	0.1	0.0
1984	1.5	1.5	0.2	0.4	0.1	0.0	0.1	0.0
1985	1.8	2.0	0.6	0.8	0.1	0.6	0.1	0.3
1986	2.8	5.5	1.8	3.8	0.1	2.1	0.1	0.7
1987	13.5	32.5	6.1	13.7	0.3	2.5	0.1	2.4
1988	7.4	34.7	11.7	16.2	1.1	8.9	0.1	4.7
1989	6.4	14.0	4.9	6.9	0.4	1.5	0.1	1.5
1990	5.1	16.5	3.7	23.4	0.5	1.5	0.1	1.5
1991	8.7	13.5	9.1	10.0	1.0	1.5	0.1	1.5
1992	5.6	13.5	4.6	10.0	0.9	1.5	0.1	1.5
1993	1.7	13.5	2.3	10.0	1.1	1.5	0.2	1.5
1994	1.4	13.5	2.7	10.0	1.0	1.5	0.3	1.5
1995	1.6	1.2	1.5	1.0	0.8	1.1	0.5	1.5
1996	0.7	1.6	1.1	1.4	0.5	0.7	0.1	0.5
1997	2.5	4.9	1.1	1.6	4.0	6.6	0.1	5.4
1998	0.7	2.5	1.0	2.5	2.3	2.0	0.1	5.4
1999	1.1	2.5	1.4	2.5	0.3	2.0	0.5	5.4
2000	1.1	1.1	1.1	2.5	0.5	2.0	0.8	5.4
2001	<0.1	1.1	0.5	3.5	0.7	2.0	1.8	2.7
2002*	0.4	1.1	0.6	3.5	1.6	2.0	2.3	2.7
2003*	0.3	1.1	1.0	3.0	1.1	2.5	3.4	3.7
2004*	<0.1	1.1	0.6	3.0	1.5	2.5	2.6	3.7

* provisional

Table 2. White Bay (WB) – Notre Dame Bay (NDB) herring landings and TAC's (t), by gear, 1993 – 2004.

Year	Area	Purse Seine	Bar Seine	Gill Net	Trap	Total	TAC
1993	WB	121	0	34	0	155	
	NDB	686	104	739	2	1531	
	Combined	807	104	773	2	1686	13500
1994	WB	145	5	20	59	229	
	NDB	234	84	859	0	1177	
	Combined	379	89	879	59	1406	13500
1995	WB	201	1	15	9	225	
	NDB	454	25	890	0	1369	
	Combined	655	26	905	9	1594	1200
1996	WB	184	0	1	0	185	
	NDB	252	0	229	0	481	
	Combined	435	0	230	0	665	1600
1997	WB	11	0	10	57	78	
	NDB	2364	0	11	7	2382	
	Combined	2375	0	21	64	2460	4900
1998	WB	106	0	6	27	139	
	NDB	484	7	30	1	522	
	Combined	606	7	36	28	661	2500
1999	WB	0	0	4	30	34	
	NDB	931	0	53	0	984	
	Combined	931	0	57	30	1018	2500
2000	WB	74	0	3	2	79	
	NDB	997	0	16	1	1014	
	Combined	1071	0	19	3	1093	2500
2001	WB	13	0	7	5	25	
	NDB	0	0	0	1	1	
	Combined	13	0	7	6	26	1100
2002*	WB	1	13	6	5	25	
	NDB	303	0	7	23	333	
	Combined	304	13	13	28	358	1100
2003*	WB	0	0	22	0	22	
	NDB	195	87	24	4	310	
	Combined	195	87	46	4	332	1100
2004*	WB	0	0	0	0	0	
	NDB	0	0	9	0	9	
	Combined	0	0	9	0	9	1100

* provisional

Table 3. Bonavista Bay (BB) – Trinity Bay (TB) herring landings and TAC's (t), by gear, 1993 – 2004.

Year	Area	Purse Seine	Bar Seine	Gill Net	Trap	Total	TAC
1993	BB	2001	4	234	0	2239	
	TB	31	2	72	1	106	
	Combined	2032	6	306	1	2345	10000
1994	BB	1984	1	357	1	2342	
	TB	39	235	71	1	346	
	Combined	2023	236	428	2	2688	10000
1995	BB	427	6	520	0	954	
	TB	271	133	91	2	497	
	Combined	698	139	611	2	1451	1000
1996	BB	345	0	300	1	645	
	TB	13	13	78	0	410	
	Combined	358	13	378	1	1054	1400
1997	BB	321	0	72	1	394	
	TB	329	211	129	41	710	
	Combined	650	211	201	42	1104	1600
1998	BB	352	62	148	0	562	
	TB	356	10	22	22	410	
	Combined	708	72	170	22	972	2500
1999	BB	563	222	94	0	879	
	TB	245	208	100	0	553	
	Combined	808	430	194	0	1432	2500
2000	BB	493	195	135	8	831	
	TB	2	190	67	0	259	
	Combined	495	385	202	0	1090	2500
2001	BB	241	16	37	0	294	
	TB	18	155	19	0	192	
	Combined	259	171	56	0	486	3500
2002*	BB	0	297	25	7	329	
	TB	200	4	13	20	237	
	Combined	200	301	38	27	566	3500
2003*	BB	343	255	56	198	852	
	TB	0	154	5	18	177	
	Combined	343	409	61	216	1029	3000
2004*	BB	0	395	29	93	517	
	TB	0	7	8	53	68	
	Combined	0	402	37	146	585	3000

* provisional

Table 4. St. Mary's Bay (SMB) – Placentia Bay (PB) herring landings and TAC's (t), by gear, 1993 – 2004.

Year	Area	Purse Seine	Bar Seine	Gill Net	Trap	Total	TAC
1993	SMB	262	0	3	0	265	
	PB	667	84	119	0	870	
	Combined	929	84	122	0	1135	1500
1994	SMB	0	0	1	0	1	
	PB	681	78	194	10	962	
	Combined	681	78	195	10	963	1500
1995	SMB	219	0	1	0	220	
	PB	332	76	135	0	543	
	Combined	551	76	136	0	763	1100
1996	SMB	217	0	1	0	217	
	PB	229	15	37	0	282	
	Combined	446	15	38	0	499	700
1997	SMB	1650	0	1	0	1651	
	PB	2186	100	20	0	2306	
	Combined	3836	100	21	0	3957	6600
1998	SMB	707	0	14	0	721	
	PB	1574	0	4	0	1578	
	Combined	2281	0	18	0	2299	2000
1999	SMB	0	0	0	0	0	
	PB	330	0	1	0	331	
	Combined	330	0	1	0	331	2000
2000	SMB	0	0	0	0	0	
	PB	447	41	4	0	492	
	Combined	447	41	4	0	492	2000
2001	SMB	57	0	0	0	57	
	PB	394	213	38	0	645	
	Combined	451	213	38	0	702	2000
2002*	SMB	100	0	0	0	100	
	PB	1297	0	135	36	1468	
	Combined	1397	0	135	36	1568	2000
2003*	SMB	0	0	0	0	0	
	PB	925	66	93	0	1084	
	Combined	925	66	93	0	1084	2500
2004*	SMB	342	0	79	0	421	
	PB	897	71	26	33	1027	
	Combined	1239	71	105	33	1448	2500

* provisional

Table 5. Fortune Bay (FB) herring landings and TAC's (t), by gear, 1993 – 2004.

Year	Purse Seine	Bar Seine	Gill Net	Trap	Total	TAC
1993	0	0	175	0	175	1500
1994	1	2	250	0	253	1500
1995	5	4	460	0	469	1500
1996	0	35	31	4	70	1500
1997	0	92	28	23	143	5400
1998	0	0	0	0	0	5400
1999	0	337	30	88	455	5400
2000	0	791	16	35	842	5400
2001	0	1592	0	190	1782	2700
2002*	0	1895	0	364	2259	2700
2003*	0	2455	0	937	3392	3700
2004*	0	1406	69	1141	2616	3700

* provisional

Table 6. Commercial landings (t) and number of fish sampled (bold print) for 2002, by stock area, gear type and month. Boxed areas indicate the landing – sample combinations used for calculating commercial landings at age.

Area	Gear	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
WB-NDB	Gill Net							2 **100**		4 **50**	7 **50**		
	Purse Seine											303 **50**	
	Bar Seine							13					
	Trap								5 **50**	3	2	18	
BB-TB	Gill Net				1 **50**	5 **50**				3	14	6 **50**	10
	Purse Seine											200 **50**	
	Bar Seine				4	292					5		
	Trap					4				3	3		17
SMB-PB	Gill Net				93	9		14	3				16 **50**
	Purse Seine			527 **50**	124 **50**							81	666 **50**
	Bar Seine												
	Trap												36
FB	Gill Net												
	Purse Seine												
	Bar Seine			483 **150**	1411 **50**								
	Trap					198	166						
				50									

Table 7. Commercial landings (t) and number of fish sampled (bold print) for 2003, by stock area, gear type and month. Boxed areas indicate the landing – sample combinations used for calculating commercial landings at age.

Area	Gear	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
WB-NDB	Gill Net				**50**			18	3		1	16	9
	Purse Seine											154	41 **50**
	Bar Seine											58	29
	Trap										4		
BB-TB	Gill Net					7					3 **50**	47	7
	Purse Seine				1	17						343 **50**	
	Bar Seine				245	9						1 **50**	
	Trap					107				1		89	
SMB-PB	Gill Net				81 **50**	23							
	Purse Seine				927 **100**								
	Bar Seine				66 **50**								
	Trap					30				4			
FB	Gill Net												
	Purse Seine												
	Bar Seine				2446 **300**	9							
	Trap				50 **50**		888 **50**						

Table 8. Commercial landings at age of spring and autumn spawning herring for White Bay – Notre Dame Bay, 1974 – 2003.

Spring Spawners

Age	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	b1987	c1988
1	1	1	1	1	1	1	1	1	1	1	1	1	195	26	3113
2	1	2	56	50	1	1	115	445	76	1	6	3	29	1105	407
3	4	128	24	1671	55	60	46	152	371	38	12	187	975	324	1044
4	123	215	506	107	2034	50	1240	41	332	46	124	350	2945	7201	291
5	3142	453	237	468	317	2928	92	1231	59	23	1218	240	308	25843	2984
6	5446	5438	868	184	1034	323	1080	63	268	14	73	1486	667	1651	11819
7	1193	7069	10893	793	517	1410	17	805	34	93	114	108	1258	1067	1036
8	697	1123	17145	7363	2509	767	496	64	258	1	157	275	198	2088	1137
9	1506	838	1328	12675	10807	2222	179	344	19	26	37	94	162	399	1454
10	858	810	3364	1055	11756	14413	1450	194	192	4	122	81	179	442	315
11+	2378	3999	8535	15707	14379	27508	14653	10908	4059	805	1938	2110	1973	4566	2943
Total	15349	20076	42957	40074	43410	49683	19369	14248	5669	1052	3802	4935	8889	44712	26543

Age	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	a2002	a2003
1	1	1	2273	1	1	1	1	1	1	1	1	1	1	1	1
2	23	1	29	940	1	1	1	159	2	1	1	1	121	1	1
3	128	1936	386	207	96	1	96	1	698	796	75	404	11	511	145
4	613	285	16183	942	31	1054	609	3	2	921	1619	175	20	238	653
5	124	637	1542	8940	263	121	2747	484	63	20	1355	1747	3	89	102
6	3106	240	553	483	3614	1674	129	1194	3420	16	1	946	23	89	11
7	10566	2451	103	371	75	2199	701	23	2939	351	5	2	1	312	1
8	370	7360	2145	211	199	108	1513	162	51	224	108	1	1	29	1
9	1081	532	4432	722	70	192	183	474	209	213	208	57	1	1	1
10	844	1132	537	2796	544	49	127	1	359	41	5	28	1	1	1
11+	2178	1148	2201	3509	861	441	337	91	427	90	14	62	1	81	1
Total	19034	15723	30384	19122	5755	5841	6444	2593	8171	2674	3392	3424	184	1353	918

Autumn Spawners

Age	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	1	6	1	1	1	1	71	1	72	1	1	1	10	2	1
4	11	64	31	45	6	1	13	13	26	74	60	29	67	297	92
5	124	3	35	35	24	10	13	86	62	25	409	94	69	469	115
6	10	25	51	85	155	267	23	11	16	23	66	333	79	156	45
7	48	16	20	54	171	172	272	1	12	1	30	137	373	112	20
8	2	21	40	1	24	160	4	100	9	1	8	32	68	630	7
9	46	3	46	94	2	133	19	1	42	6	7	23	6	152	560
10	7	2	4	1	130	1	1	4	1	1	3	10	1	10	6
11+	346	302	329	182	238	298	450	65	23		24	74	42	108	306
Total	597	444	559	500	753	1045	868	284	265	134	610	735	717	1938	1154

Age	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	a2002	a2003
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	11	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	19	1	1	1	28	7	1	1
4	65	130	188	109	1	7	11	1	56	106	187	176	1	134	108
5	12	65	450	187	48	70	37	1	72	26	113	613	1	31	363
6	5	52	98	172	78	80	2	80	20	1	150	169	2	14	26
7	574	84	36	48	113	137	120	16	233	1	38	139	1	137	102
8	70	37	128	46	79	25	3	3	1	13	1	2	1	26	26
9	1	1	249	80	42	4	24	3	69	20	1	28	1	1	26
10	533	4	120	19	21	1	1	3	1	1	1	1	1	2	1
11+	29	577	2733	613	349	14	204	1	34	1	113	28	1	54	1
Total	1292	953	4005	1277	734	341	415	129	489	172	607	1186	18	402	656

Spring and Autumn Spawners

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Total	15946	20520	43516	40574	44163	50728	20237	14532	5934	1186	4412	5670	9606	46650	27697
% SS	96.3	97.8	98.7	98.8	98.3	97.9	95.7	98.0	95.5	88.7	86.2	87.0	92.5	95.8	95.8
% AS	3.7	2.2	1.3	1.2	1.7	2.1	4.3	2.0	4.5	11.3	13.8	13.0	7.5	4.2	4.2

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	a2002	a2003
Total	20326	16676	34389	20399	6489	6182	6859	2722	8660	2846	3999	4610	202	1755	1574
% SS	93.6	94.3	88.4	93.7	88.7	94.5	94.0	95.3	94.4	94.0	84.8	74.3	91.1	77.1	58.3
% AS	6.4	5.7	11.6	6.3	11.3	5.5	6.0	4.7	5.6	6.0	15.2	25.7	8.9	22.9	41.7

a - preliminary
b - also 4475 age 0 SS
c - also 10 age 0 SS

Table 9. Commercial landings at age of spring and autumn spawning herring for Bonavista Bay - Trinity Bay, 1974 - 2003.

Spring Spawners

Age	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	b1985	1986	c1987	1988
1	1	1	5	10	1	1	1	1	1	1	1	1	151	296	717
2	1	1	14	16	22	6	15	136	1	1	4	13	207	1352	6612
3	1	392	77	248	26	286	13	246	8	4	22	175	443	413	9910
4	2	134	493	135	357	167	195	53	11	34	35	70	4445	2845	267
5	235	163	123	759	122	765	43	256	2	7	210	87	261	16208	3674
6	4795	2564	166	227	251	19	293	26	30	2	9	351	161	334	21739
7	424	14330	4897	50	112	436	52	288	5	15	5	37	262	359	782
8	151	455	20697	6209	598	101	264	23	35	1	12	27	38	126	713
9	294	995	909	23206	4412	530	75	321	5	8	2	13	10	33	8
10	69	727	854	774	13394	5575	967	88	65	2	2	22	31	6	55
11+	1849	1679	4306	5890	5956	19994	12259	11762	1186	159	154	797	657	956	1247
Total	7822	21441	32541	37524	25251	27880	14177	13200	1349	234	456	1593	6666	22928	45724

Age	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	a2002	a2003
1	1	1	115	1	1	1	4	1	1	1	1	48	1	1	1
2	563	58	689	499	354	1	1	1	75	57	50	355	197	1	1
3	1043	3094	210	1056	621	394	107	23	302	533	49	204	252	596	606
4	3323	422	13551	271	160	819	2645	63	13	507	805	215	188	412	1543
5	264	2350	2586	12612	344	303	349	2638	96	93	566	756	33	170	300
6	1428	94	3859	2422	3779	1072	64	345	3230	135	11	383	54	59	84
7	8639	629	347	579	422	3878	152	46	182	1388	14	48	139	117	1
8	13	4439	1550	194	385	479	978	157	7	98	1557	23	39	2	1
9	216	235	7505	1394	132	471	172	430	1	4	920	898	1	2	1
10	100	325	447	2054	657	530	163	11	29	4	62	110	5	1	1
11+	508	466	891	653	1092	2614	649	300	94	88	105	218	137	155	37
Total	16098	12113	31750	21735	7947	10562	5284	4015	4030	2908	4140	3258	1046	1516	2576

Autumn Spawners

Age	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
1	1	1	1	1	1	1	1	1	1	1	1	1	1	19	1
2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	253
3	1	1	10	1	1	1	14	6	3	1	1	1	1	1	54
4	1	26	22	55	16	1	11	115	1	10	3	5	51	2	22
5	1	30	77	16	14	27	17	106	8	2	84	18	80	391	88
6	1	1	23	176	61	114	83	33	10	5	14	203	59	237	357
7	16	22	66	86	58	30	188	83	3	2	17	96	292	87	216
8	2	41	34	112	28	175	45	283	8	1	3	54	149	360	202
9	1	6	62	30	23	13	112	36	25	1	5	22	24	138	818
10	1	19	8	73	82	16	3	4	1	1	1	10	1	2	2
11+	1216	259	1069	1069	417	800	463	230	37	3	9	29	30	156	237
Total	1242	407	1373	1620	702	1179	938	898	98	28	139	440	689	1394	2250

Age	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	a2002	a2003
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	13	1	1	1	22	1	1	1	1
3	1	5	6	1	11	1	6	1	33	1	58	41	74	1	64
4	55	139	140	10	1	1	39	1	63	239	64	75	28	159	242
5	76	55	837	219	146	53	90	119	26	324	184	136	57	153	333
6	136	9	152	205	205	168	4	126	88	121	258	110	224	316	137
7	237	61	17	118	163	27	1	16	39	138	42	172	116	246	368
8	18	50	99	1	121	114	48	29	3	76	56	130	165	179	6
9	83	58	104	5	39	1	24	11	6	2	61	9	64	1	1
10	697	19	125	1	14	1	1	1	19	35	59	36	13	1	1
11+	193	89	481	167	376	79	206	20	4	16	20	164	177	70	159
Total	1498	487	1963	729	1078	446	433	326	283	954	825	875	920	1128	1313

Spring and Autumn Spawners

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Total	9064	21848	33914	39144	25953	29059	15115	14098	1447	262	595	2033	7355	375	221
% SS	86.3	98.1	96.0	95.9	97.3	95.9	93.8	93.6	93.2	89.3	76.6	78.4	90.6	15.7	38.0
% AS	13.7	1.9	4.0	4.1	2.7	4.1	6.2	6.4	6.8	10.7	23.4	21.6	9.4	84.3	62.0

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	a2002	a2003
Total	17596	12600	33713	22464	9025	11008	5717	4341	4313	3862	4965	4133	1966	2644	3889
% SS	91.5	96.1	94.2	96.8	88.1	95.9	92.4	92.5	93.4	75.3	83.4	78.8	53.2	57.3	66.2
% AS	8.5	3.9	5.8	3.2	11.9	4.1	7.6	7.5	6.6	24.7	16.6	21.2	46.8	42.7	33.8

a - preliminary
b - also 10 age 0 SS
c - also 3124 age 0 SS

Table 10. Commercial landings at age of spring and autumn spawning herring for St. Mary's Bay - Placentia Bay, 1974 – 2003.

Spring Spawners

Age	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
1	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	995	74	365	52	30	87	133	1	1	1	8	1	1	34	1
3	280	2234	391	1423	175	663	332	193	1	5	9	7	1	19	1
4	234	471	1906	140	1817	279	133	42	2	2	24	18	143	2	22
5	126	147	208	736	123	2263	153	111	3	3	36	27	19	502	163
6	14328	1591	267	87	596	96	1270	51	8	2	6	21	28	29	2457
7	436	13858	862	50	64	614	57	338	3	4	3	15	9	47	119
8	6049	146	5622	1039	106	85	470	28	14	1	24	3	4	9	213
9	138	3391	201	3830	512	66	38	80	4	9	1	25	1	3	16
10	238	350	2256	134	3827	501	237	6	4	1	10	5	5	1	36
11+	624	1323	1361	2448	2185	4785	2971	466	69	39	44	125	30	11	147
Total	23451	23586	13440	9940	9436	9440	5795	1317	110	68	166	248	242	658	3176

Age	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	a2002	a2003
1	1	1	1	1	1	13	1	1	1	1	1	1	1	1	1
2	22	1	37	68	5	24	1	19	235	151	1	1	1	1	1
3	48	115	1	47	62	137	333	19	125	487	21	11	1	190	73
4	9	189	222	7	34	5	1418	224	1	205	21	579	28	18	565
5	1	64	160	363	11	36	37	1187	1656	61	1	156	329	124	20
6	24	15	170	231	187	6	1	94	8237	873	1	63	392	1183	81
7	463	30	12	55	118	225	1	43	465	3222	84	60	168	236	1120
8	34	494	110	53	74	60	63	32	134	299	292	291	39	89	46
9	100	45	493	74	63	98	1	51	76	186	42	127	268	19	1
10	5	172	88	383	56	172	16	16	50	43	21	35	153	202	46
11+	34	128	948	965	1174	1042	416	177	280	109	63	392	440	1216	470
Total	741	1254	2242	2247	1785	1818	2288	1863	11260	5637	548	1716	1820	3279	2424

Autumn Spawners

Age	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1
3	2	1	11	1	1	1	1	1	1	1	1	1	1	4	1
4	2	7	4	47	23	11	96	139	1	18	17	9	16	12	20
5	96	68	214	52	435	143	35	116	7	6	101	20	24	32	30
6	146	182	67	209	92	598	52	10	1	12	32	86	15	80	239
7	80	89	32	81	244	73	419	11	1	4	21	46	97	30	90
8	95	206	17	69	122	216	79	50	1	1	5	36	28	82	35
9	93	6	94	26	38	21	126	7	1	1	3	10	16	24	270
10	51	37	11	22	52	2	25	1	1	1	1	3	4	3	5
11+	970	677	329	526	561	348	492	29	2	4	8	24	15	12	53
Total	1537	1275	781	1035	1570	1415	1327	366	18	50	191	237	218	282	745

Age	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	a2002	a2003
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	5	7	1	1	1	7	1	19	76	61	1	12	1	1	1
4	5	37	14	7	2	7	105	40	295	231	1	16	20	113	37
5	18	61	87	8	208	62	112	82	188	445	1	73	118	18	509
6	8	54	40	50	239	116	35	102	1231	273	42	46	209	239	100
7	56	24	23	33	173	182	106	10	1361	764	63	98	185	534	673
8	43	47	65	27	41	231	99	19	229	694	104	30	243	343	407
9	67	58	98	64	41	182	87	9	306	376	63	26	2	85	16
10	178	17	40	1	3	1	78	1	50	23	104	9	7	76	91
11+	164	173	495	479	863	411	282	74	730	255	125	90	155	247	217
Total	546	480	865	672	1573	1201	907	358	4468	3124	506	402	942	1658	2053

Spring and Autumn Spawners

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Total	24988	24861	14221	10975	11006	10855	7122	1683	128	118	357	485	460	1422	181
% SS	93.8	94.9	94.5	90.6	85.7	87.0	81.4	78.3	85.9	57.6	46.5	51.1	52.6	83.2	44.8
% AS	6.2	5.1	5.5	9.4	14.3	13.0	18.6	21.7	14.1	42.4	53.5	48.9	47.4	16.8	55.2

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	a2002	a2003
Total	1287	1734	3107	2919	3358	3019	3195	2221	15728	8761	1054	2118	2762	4937	4477
% SS	57.6	72.3	72.2	77.0	53.2	60.2	71.6	83.9	71.6	64.3	52.0	81.0	65.9	66.4	54.1
% AS	42.4	27.7	27.8	23.0	46.8	39.8	28.4	16.1	28.4	35.7	48.0	19.0	34.1	33.6	45.9

a - preliminary

Table 11. Commercial landings at age of spring and autumn spawning herring for Fortune Bay, 1974 - 2003.

Spring Spawners

Age	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	389	2	82	27	1	1	25	1	1	1	2	1	1	1	1
3	1314	277	15	2103	42	1	16	144	1	2	1	54	1	1	1
4	552	581	318	25	2677	183	3	16	3	2	4	3	145	1	1
5	130	112	228	327	62	3833	69	4	3	1	3	39	4	304	1
6	4435	87	129	166	237	15	1122	3	1	1	2	12	69	11	219
7	250	1490	11	26	43	165	7	21	2	1	1	2	20	49	7
8	1094	16	338	43	139	5	183	2	36	1	2	1	6	18	26
9	36	142	36	188	52	24	1	23	1	10	1	1	1	4	6
10	117	22	188	4	326	1	11	1	5	1	2	1	2	1	1
11+	255	201	140	244	302	167	50	12	5	18	23	15	14	38	10
Total	8573	2931	1486	3154	3882	4396	1488	228	59	39	42	130	264	429	274

Age	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	a2002	a2003
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1	1	1	513	1	1
3	1	1	1	1	2	6	1	1	1	1	108	1	114	1	1
4	1	1	23	1	1	1	1	201	1	1	27	156	144	1	802
5	1	2	8	3	1	2	14	12	1	1	1	10	3651	1	1
6	18	2	1	1	327	1	14	17	1	1	49	23	257	3831	65
7	274	12	1	1	2	24	24	1	1	1	817	99	172	100	6505
8	1	155	6	1	3	9	569	1	1	1	153	1184	314	144	272
9	17	17	274	2	8	23	36	47	1	1	120	201	742	122	4
10	11	20	1	75	10	8	36	6	15	1	1	191	344	632	71
11+	24	1	72	266	217	647	728	38	355	1	479	830	1259	3408	3180
Total	350	213	389	353	573	723	1425	326	379	11	1757	2697	7511	8242	10903

Autumn Spawners

Age	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	7	1	7	1	1	1	1	5	1	1	1	1	1	1	1
4	9	22	9	23	1	7	4	64	1	1	1	17	3	1	2
5	87	12	38	19	36	5	3	16	7	1	9	4	8	4	1
6	65	39	26	19	6	50	3	1	2	2	4	26	16	7	5
7	12	19	13	1	25	1	3	1	1	1	6	12	38	11	5
8	27	20	1	1	12	17	1	1	1	1	1	7	12	25	1
9	5	11	27	1	6	12	1	1	1	1	1	4	5	10	13
10	1	7	1	1	1	1	1	1	1	1	1	1	1	5	1
11+	85	45	9	2	18	12	1	1	1	1	1	2	5	14	10
Total	300	178	133	70	108	108	20	93	18	12	27	76	91	80	41

Age	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	a2002	a2003
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1	1	1	1	29	1	1
4	3	10	1	1	1	1	1	1	1	1	1	10	1	1	33
5	6	5	1	4	1	1	1	1	1	1	1	26	86	1	1299
6	1	12	8	5	3	1	1	1	1	1	1	26	286	1	195
7	6	17	1	3	11	1	25	1	1	1	27	46	114	11	231
8	31	7	3	1	1	1	31	1	1	1	1	36	86	11	260
9	3	54	1	1	1	1	10	2	1	1	1	8	1	1	97
10	17	1	3	1	1	1	1	1	1	1	1	17	143	1	130
11+	5	5	1	5	26	14	1	1	1	1	2	148	314	79	166
Total	75	114	22	24	48	24	74	12	11	11	38	320	1062	109	2414

Spring and Autumn Spawners

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Total	8873	3109	1619	3224	3990	4504	1508	321	77	51	69	206	355	3832	260
% SS	96.6	94.3	91.8	97.8	97.3	97.6	98.7	71.0	76.6	76.5	60.9	63.1	74.4	100.0	25.0
% AS	3.4	5.7	8.2	2.2	2.7	2.4	1.3	29.0	23.4	23.5	39.1	36.9	25.6	0.0	75.0

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	a2002	a2003
Total	425	327	411	377	621	747	1499	338	390	22	1795	3017	8573	8351	13317
% SS	82.4	65.1	94.6	93.6	92.3	96.8	95.1	96.4	97.2	50.0	97.9	89.4	87.6	98.7	81.9
% AS	17.6	34.9	5.4	6.4	7.7	3.2	4.9	3.6	2.8	50.0	2.1	10.6	12.4	1.3	18.1

a - preliminary

Table 12. Parameters, catch data, catch rates, and effort, by stock area and year, from research gill net data.

Stock Area	Year	Number of Fishers	Fishing Dates Start	Fishing Dates End	Total Catch (numbers)	Catch Rate (numbers per nights fished) AS	Catch Rate (numbers per nights fished) SS	Catch Rate (numbers per nights fished) Comb.	Effort (net nights per fisher)
WBNDB	1988	5	14 May	17 June	17759	9	146	156	570
	1989	7	25 April	24 June	99614	61	486	547	910
	1990	7	25 April	22 June	121218	27	679	706	859
	1991	7	8 May	31 July	117333	25	685	709	827
	1992	6	6 May	7 July	139253	28	859	887	785
	1993	6	3 May	9 July	104251	67	607	674	773
	1994	7	2 May	18 July	110697	72	586	658	841
	1995	7	15 May	27 July	103011	53	560	613	840
	1996	7	7 May	11 July	114465	71	470	541	1058
	1997	7	13 May	11 July	70338	32	320	352	998
	1998	7	5 May	10 July	53055	26	246	272	975
	1999	7	5 May	16 July	46465	14	202	216	1075
	2000	6	25 April	22 July	10681	9	49	58	920
	2001	7	8 May	20 July	29934	29	107	136	1100
	2002	9	21 April	31 July	10768	10	29	39	1372
	2003	9	19 April	31 July	31444	20	91	111	1412
	2004	8	23 April	31 July	30881	22	99	121	1278
BBTB	1988	7	9 May	17 June	6554	1	51	53	622
	1989	8	18 April	12 June	25250	10	96	106	1189
	1990	7	10 April	6 June	28748	11	135	146	982
	1991	8	30 April	26 June	40320	20	188	209	966
	1992	8	20 April	18 June	35196	15	138	153	1152
	1993	8	23 April	15 June	28373	17	113	130	1090
	1994	8	18 April	21 June	45863	19	168	187	1227
	1995	7	9 May	27 June	20836	10	99	110	950
	1996	7	11 April	18 June	58278	29	229	259	1127
	1997	8	16 April	26 June	73135	33	279	312	1172
	1998	8	21 April	29 June	25564	19	83	102	1257
	1999	8	15 April	26 June	23290	21	60	81	1440
	2000	8	3 April	26 June	15579	16	41	57	1373
	2001	8	4 May	20 July	14303	18	32	50	1436
	2002	10	15 April	18 July	9859	4	23	27	1814
	2003	10	9 April	12 July	37597	36	72	108	1747
	2004	9	14 April	17 July	54260	60	121	181	1499

Table 12 cont'. Parameters, catch data, catch rates, and effort, by stock area and year, from research gill net data.

Stock Area	Year	Number of Fishers	Fishing Dates Start	Fishing Dates End	Total Catch (numbers)	Catch Rate (numbers per nights fished) AS	Catch Rate (numbers per nights fished) SS	Catch Rate (numbers per nights fished) Comb.	Effort (net nights per fisher)
SMBPB	1982	4	17 April	15 May	1905	4	12	16	595
	1983	5	6 April	3 June	9174	21	44	65	708
	1984	4	5 April	14 June	34405	129	116	246	700
	1985	4	10 April	6 June	35835	133	143	276	650
	1986	5	10 April	13 June	37840	98	172	270	700
	1987	5	1 April	31 May	43693	72	211	282	774
	1988	5	2 April	29 May	23140	29	141	170	681
	1989	5	4 April	7 June	21634	25	123	148	730
	1990	5	9 April	6 June	28591	53	139	192	743
	1991	5	3 April	12 June	9971	25	42	67	745
	1992	5	8 April	10 June	13264	32	55	87	765
	1993	5	5 April	11 June	10727	25	46	72	750
	1994	5	7 April	7 June	22350	36	106	142	785
	1995	5	5 April	3 June	12861	14	70	84	765
	1996	5	2 April	12 June	54047	61	266	328	825
	1997	5	4 April	4 June	30290	55	136	191	795
	1998	5	1 April	5 June	19392	41	80	121	803
	1999	5	1 April	27 May	38665	82	164	246	785
	2000	5	4 April	3 June	36152	107	125	232	780
	2001	5	5 April	8 June	37536	63	168	232	810
	2002	6	1 April	14 June	85521	145	262	407	1050
	2003	6	4 April	12 June	37122	45	147	192	965
	2004	6	5 April	18 June	22115	26	84	110	1009
FB	1982	2	16 April	22 May	799	2	10	12	325
	1983	2	11 April	16 May	10653	49	129	178	300
	1984	1	19 April	18 May	5908	71	156	227	130
	1985	2	16 April	17 May	38301	175	462	636	301
	1986	3	15 April	6 June	44175	65	399	464	476
	1987	3	8 April	22 May	63850	70	690	760	420
	1988	3	13 April	23 May	46435	37	517	554	419
	1989	3	11 April	23 May	84066	81	927	1008	417
	1990	3	17 April	24 May	48466	47	479	527	460
	1991	3	9 April	28 May	50778	36	561	597	425
	1992	3	16 April	12 June	30235	51	331	383	395
	1993	3	13 April	5 June	39774	49	413	462	430
	1994	3	13 April	10 June	62870	46	668	714	440
	1995	3	18 April	23 June	56079	74	684	758	370
	1996	3	3 April	27 May	93868	58	862	920	510
	1997	3	7 April	31 May	96821	91	980	1071	452
	1998	3	7 April	30 May	111464	51	1224	1275	437
	1999	3	1 April	26 May	90685	213	854	1067	425
	2000	3	1 April	30 May	76734	159	727	886	433
	2001	3	6 April	1 June	110487	97	1131	1228	450
	2002	4	3 April	31 May	60195	93	447	540	557
	2003	4	23 April	31 May	61701	78	463	541	570
	2004	4	3 April	31 May	40159	42	249	291	690

Table 13. Research gill net catch rates at age (numbers per days fished), spring spawners only, by stock area and year.

White Bay - Notre Dame Bay

Age	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
1							0.0	0.0	0.0	0.0	0.0	0.0
2							0.0	0.0	0.0	0.0	0.0	0.0
3							4.7	16.0	83.5	11.0	0.0	1.2
4							1.9	43.3	51.6	247.1	21.5	10.9
5							22.2	11.2	52.9	28.8	493.7	51.0
6							59.6	126.9	16.3	13.7	33.5	359.9
7							5.6	182.9	144.6	7.5	13.7	18.8
8							4.7	9.7	195.5	84.2	10.3	6.7
9							12.0	16.0	11.5	164.3	47.2	13.4
10							1.8	24.3	26.5	21.9	127.9	29.7
11+							34.1	56.4	97.1	106.1	110.8	115.9
Total							146.4	486.4	678.8	684.6	858.6	606.9

Age	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	
3	0.6	0.0	0.0	3.2	7.9	6.5	0.3	0.5	11.0	3.6	
4	232.0	18.5	0.9	0.6	117.6	70.3	2.6	44.2	3.0	65.9	
5	14.6	300.1	47.9	3.2	0.2	85.1	14.8	8.1	4.7	2.7	
6	52.1	20.2	286.0	77.1	1.2	1.0	16.8	37.5	3.6	9.5	
7	182.7	45.9	12.7	139.5	10.3	0.4	0.2	15.5	2.1	1.3	
8	14.1	104.1	21.6	8.6	43.3	9.5	0.9	0.1	0.7	4.6	
9	7.6	8.4	74.2	17.6	1.7	15.0	0.4	0.2	0.2	1.5	
10	12.9	9.5	5.2	31.0	6.9	2.8	0.6	0.6	0.5	1.2	
11+	69.1	52.1	21.1	39.4	56.8	18.0	12.1	0.1	3.0	0.7	
Total	585.7	559.8	469.5	320.0	246.0	202.1	48.7	106.8	28.9	91.1	98.8

Bonavista Bay - Trinity Bay

Age	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
1							0.0	0.0	0.0	0.0	0.0	0.0
2							0.1	0.1	0.0	0.0	0.0	0.0
3							5.6	2.3	8.8	0.9	0.3	2.6
4							0.3	21.8	8.2	50.1	1.2	1.7
5							2.3	0.9	27.7	12.0	46.2	8.2
6							29.2	5.5	4.5	27.9	8.1	50.6
7							0.5	57.7	12.2	3.2	10.3	6.4
8							0.4	0.9	60.8	19.8	2.3	7.0
9							0.6	0.6	0.8	62.3	17.6	3.7
10							0.0	0.7	3.2	3.8	34.8	13.1
11+							12.2	5.5	8.9	8.3	16.8	20.2
Total							51.2	96.1	135.1	188.2	137.6	113.5

Age	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.0	
3	0.7	0.0	0.0	2.8	1.2	0.1	0.1	3.4	11.0	2.5	
4	16.6	34.3	0.9	0.0	5.7	17.6	2.6	3.3	5.8	47.3	
5	9.6	8.2	140.9	3.3	0.2	7.2	11.9	2.0	2.3	12.2	
6	12.6	1.7	20.8	181.9	1.7	0.4	5.8	10.0	0.6	2.9	
7	65.0	4.6	5.3	23.7	62.3	0.8	0.4	3.0	1.5	0.4	
8	6.5	19.9	5.5	5.6	4.6	29.8	0.2	0.5	0.5	1.5	
9	8.9	2.6	20.8	7.0	2.1	1.4	12.7	0.9	0.1	0.6	
10	7.5	3.0	3.7	16.7	1.3	0.3	4.1	3.8	0.0	0.9	
11+	40.1	25.0	31.4	38.2	5.9	2.3	2.6	5.1	1.2	3.7	
Total	167.6	99.2	229.1	278.9	83.0	59.9	40.5	32.1	23.0	72.1	121.3

Table 13 (cont.'). Research gill net catch rates at age (numbers per days fished), spring spawners only, by stock area and year.

St. Mary's Bay - Placentia Bay

Age	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.2	1.6	0.7	0.0	0.0	0.0	0.4	0.2	0.1	0.1	0.0	0.2
3	0.2	10.2	18.6	59.3	0.3	13.7	2.3	23.5	11.2	0.9	2.7	3.5
4	0.6	1.8	21.9	5.9	125.6	1.7	4.2	6.0	19.5	16.5	0.7	3.3
5	0.4	0.9	7.0	9.9	8.5	152.1	2.7	1.8	5.7	7.1	21.8	1.5
6	1.4	1.0	2.7	6.9	17.4	11.6	100.2	3.5	2.4	1.9	3.8	12.1
7	0.2	3.2	0.9	2.4	3.4	17.7	6.2	64.3	5.0	0.5	2.4	2.4
8	1.7	0.4	7.3	2.1	2.6	4.0	14.4	3.3	69.9	1.1	1.0	2.7
9	0.4	4.7	0.2	8.6	0.1	2.1	3.0	12.6	2.4	8.3	1.6	1.1
10	0.4	0.5	10.1	2.7	2.4	0.6	0.1	3.1	16.7	1.1	7.5	2.1
11+	6.5	19.4	47.0	45.4	12.1	7.4	7.2	4.9	6.8	4.8	13.1	17.2
Total	11.9	43.8	116.3	143.1	172.5	210.7	140.7	123.2	139.5	42.3	54.8	46.2

Age	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2	0.0	0.0	0.0	0.0	0.6	1.1	0.2	0.3	0.8	1.2	
3	15.6	11.3	0.0	4.1	22.6	67.7	11.6	5.4	106.3	1.0	
4	25.4	49.2	54.9	0.3	5.5	21.4	74.2	5.9	1.8	117.4	
5	2.9	1.8	159.8	20.4	0.3	8.0	13.8	98.2	6.0	3.1	
6	0.4	0.4	9.3	66.7	10.1	0.0	6.1	21.4	46.1	0.3	
7	6.9	0.8	5.9	12.6	26.2	13.0	0.1	9.8	7.9	10.9	
8	2.1	1.8	1.9	2.4	4.4	31.2	2.2	6.6	1.8	2.6	
9	3.8	1.2	5.9	2.2	1.3	4.4	3.2	8.6	0.8	3.5	
10	3.2	0.3	0.8	0.5	1.0	2.1	1.5	9.8	7.1	0.1	
11+	45.6	3.5	28.0	26.8	7.9	15.1	11.6	2.5	83.3	6.8	
Total	105.9	70.3	266.3	135.8	79.8	164.3	124.7	168.4	261.9	147.1	83.8

Fortune Bay

Age	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0
3	0.6	8.4	0.0	14.3	0.0	0.0	0.0	12.1	98.8	0.6	0.3	0.0
4	0.8	6.0	22.1	2.8	224.0	0.0	0.0	0.9	1.4	54.4	3.6	0.0
5	0.6	3.9	15.0	204.5	8.8	532.2	3.1	0.9	0.0	16.8	61.3	9.1
6	0.1	3.1	6.1	69.2	69.9	11.7	420.7	15.8	0.0	2.2	11.6	140.4
7	0.2	2.4	1.4	15.7	48.3	48.3	9.8	659.3	6.2	1.7	1.3	5.0
8	6.0	2.7	4.1	4.6	10.0	20.7	50.6	14.8	236.8	21.9	1.7	3.7
9	0.3	44.0	0.3	8.8	0.8	4.8	11.4	64.9	19.7	283.8	6.3	0.0
10	0.8	4.6	4.4	6.5	2.0	1.4	2.1	33.4	59.0	38.1	70.3	9.5
11+	0.8	53.7	102.5	135.3	35.9	71.8	19.6	124.3	56.1	141.4	175.0	245.3
Total	10.3	128.7	156.0	461.6	399.3	690.2	516.8	927.3	479.4	560.9	331.4	413.0

Age	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
3	1.3	0.0	0.0	0.0	2.4	82.8	0.0	0.0	8.1	0.0	
4	32.1	22.6	19.0	0.0	3.7	36.7	124.2	1.1	0.9	19.0	
5	14.0	85.4	134.5	89.2	0.0	21.3	40.7	235.2	4.9	0.9	
6	21.4	8.9	112.1	193.1	514.2	15.4	8.7	49.7	194.2	5.6	
7	252.5	19.8	12.1	103.9	144.5	245.8	10.9	65.6	23.3	246.2	
8	3.3	258.4	19.0	19.6	161.6	161.3	124.2	75.8	6.3	16.7	
9	12.0	39.0	187.1	17.6	19.6	40.1	109.7	122.1	5.8	3.7	
10	12.0	12.3	19.0	104.9	28.2	21.3	55.9	117.6	11.6	0.9	
11+	319.3	237.2	360.4	451.8	350.2	230.4	251.4	463.6	192.8	169.4	
Total	668.0	683.6	862.3	980.0	1224.3	853.5	726.6	1130.6	447.4	462.8	248.8

Table 14. Parameters, catch data, catch rates, effort, and abundance indices, by stock area and year, from commercial gill net logbook data.

Stock Area	Year	Number of Fishers	Mean Fisher Age	Fishing Dates Start	Fishing Dates End	Mean Mesh Size (mm)	Mean Panel Size (sq m)	Total Logbook Catch (t)	Total Comm. Landings (t)	Catch / Std. Net / Night Fished (kg)	Effort (net nights per fisher)	Current Year Abundance Index	Previous Year Abundance Index	Current Year Spawning Index
WBNDB	1981	8	-	01-Apr	23-May	-	-	50.5	2855	68.5	825	-	-	-
	1983	38	-	18-Apr	14-Jul	-	-	68.0	406	41.8	2088	-	-	-
	1996	16	-	01-Apr	18-Jun	64.7	299	68.5	229	38.4	2970	-	5.75	-
	1997	9	45	10-May	30-Jun	63.8	205	9.2	21	36.7	1031	5.00	5.85	7.00
	1998	13	47	15-Apr	30-Jun	62.6	237	8.7	36	14.9	1832	3.00	3.33	3.91
	1999	5	38	20-Apr	30-Jun	63.3	363	9.7	57	17.3	1027	5.83	3.67	3.80
	2000	8	47	15-Apr	10-Jul	63.4	310	6.8	19	22.5	727	2.69	3.93	3.55
	2001	10	45	05-May	12-Jul	60.8	201	8.2	7	25.3	910	4.60	3.22	4.42
	2002	8	49	30-Apr	05-Jul	60.0	243	0.8	13	2.2	719	2.30	3.13	1.00
	2003	9	52	29-Apr	01-Jul	59.2	175	9.4	46	24.3	1405	4.00	3.86	2.70
	2004	6	52	22-Apr	30-Jun	61.4	162	3.9	9	24.6	378	3.78	-	1.00
BBTB	1981	10	-	02-Apr	04-May	-	-	33.0	1766	25.9	1291	-	-	-
	1983	18	-	18-Apr	25-Jun	-	-	11.5	69	15.5	823	-	-	-
	1996	11	-	02-Apr	05-Jun	65.3	214	51.5	378	52.6	2153	-	6.17	-
	1997	6	45	07-Apr	27-Jun	66.1	312	39.4	201	27.9	1818	8.00	5.80	8.33
	1998	6	45	02-Apr	21-Jun	66.0	245	16.3	170	13.5	1655	5.00	6.00	7.33
	1999	5	51	02-Apr	29-Jun	66.0	330	28.7	194	27.8	657	6.00	3.70	3.50
	2000	9	49	08-Apr	30-Jun	65.3	349	23.6	202	36.7	1018	4.27	4.45	3.71
	2001	10	46	13-Apr	30-Jun	66.3	298	22.3	56	33.2	964	3.82	3.44	3.60
	2002	10	53	20-Apr	21-Jun	66.5	309	6.0	38	10.2	574	2.50	3.33	2.50
	2003	4	57	01-May	30-Jun	66.7	210	4.9	61	23.4	358	4.80	2.75	4.00
	2004	3	57	21-Apr	30-Jun	65.3	138	2.6	37	9.3	327	2.75	-	2.00
SMBPB	1983	6	-	18-Apr	29-Jun	-	-	1.2	40	3.4	320	-	-	-
	1996	13	-	19-Mar	15-Jun	67.1	261	45.3	37	31.4	2073	-	5.50	-
	1997	6	50	12-Feb	24-Jun	68.3	265	15.4	21	20.7	2171	3.50	3.29	4.50
	1998	8	52	17-Mar	25-Jun	68.2	257	25.9	18	20.2	5361	2.57	3.38	4.83
	1999	6	51	21-Feb	29-May	65.6	319	11.9	1	12.0	2981	2.75	4.50	1.83
	2000	1	57	01-Apr	26-May	66.7	334	2.7	4	10.1	280	4.00	2.80	2.00
	2001	3	52	28-Apr	23-Jun	65.3	226	2.0	38	10.2	235	3.00	3.60	3.25
	2002	4	56	20-Feb	08-Jun	66.3	241	75	135	39.4	1692	5.00	3.40	3.50
	2003	4	56	20-Mar	17-Jun	65.7	240	9.2	93	23.9	658	3.60	4.00	5.00
	2004	2	58	08-Apr	15-Jun	64.8	259	1.1	105	5.4	332	3.50	-	1.50
FB	1996	11	-	08-Apr	10-Jun	68.6	304	60	31	37.5	3044	-	7.33	-
	1997	13	50	29-Mar	28-Jun	66.9	271	68.9	28	39.4	5919	7.60	6.55	8.43
	1998	11	49	01-Apr	17-Jun	65.2	218	41.3	0	54.7	2776	7.40	8.38	7.22
	1999	8	49	21-Mar	15-Jun	65.8	313	36.1	30	37.9	1432	8.14	8.10	7.14
	2000	11	50	25-Mar	12-Jun	66.5	263	96.5	16	83.5	2364	8.45	7.63	8.09
	2001	8	54	28-Mar	21-Jun	65.6	311	54.6	0	38.2	1668	6.75	6.86	6.00
	2002	7	53	28-Mar	29-Jun	65.5	297	35.7	0	50.6	1093	6.71	6.00	6.40
	2003	7	53	08-Apr	18-Jun	66.1	283	16.3	0	36.6	581	5.00	4.67	6.13
	2004	5	53	30-Mar	23-Jun	68.1	305	10.7	69	24.6	728	4.33	-	4.67

Table 15. Parameters, landings data, discard data, effort, and abundance indices, by stock area and year, from commercial purse seine questionnaires.

Stock Area	Year	Number who Fished	Number to Respond	Mean Fisher Age	Mean Vessel Capacity (t)	Mean Seine Panel Area (sq m)	Total Estimate of Landings (t)	Total Comm. Landings (t)	Total Estimate of Discards (t)	Estimate of Discard Survival (%)	Total Estimate of Removals (t)	Effort (sets per fisher)	Current Year Abundance Index	Previous Year Abundance Index
WBNDB	1996	18	17	43	41.4	11538	392	435	446	49	620	1.5	7.88	7.83
	1997	15	14	49	32.1	10963	1801	2375	2045	97	1866	21.0	6.92	7.00
	1998	6	6	46	30.6	11639	302	606	540	93	338	18.0	6.75	3.00
	1999	7	7	52	37.2	10254	882	931	116	39	953	10.0	8.50	6.40
	2000	12	9	50	38.6	10816	651	1071	130	100	651	2.4	5.88	-
	2001	0	0	-	-	-	-	13	-	-	-	-	-	6.33
	2002	3	3	51	68.0	8187	260	304	25	93	262	4.0	8.67	9.00
	2003	4	4	53	63.5	10903	201	195	192.5	40	317	2.0	9.00	-
	2004	-	-	-	-	-	-	-	-	-	-	-	-	-
BBTB	1996	21	21	46	26.4	12040	738	358	209	50	842	4.4	8.62	7.38
	1997	16	15	45	25.5	10374	736	650	47	60	755	9.1	6.93	8.25
	1998	13	11	48	21.9	10080	621	708	9	50	625	10.1	7.55	7.25
	1999	14	14	47	26.8	10461	894	808	219	69	962	8.8	5.79	6.80
	2000	7	5	50	31.8	10538	344	495	264	95	358	14.6	5.00	8.25
	2001	5	4	54	31.2	11237	260	259	2030	83	615	31.5	7.75	7.00
	2002	5	4	55	43.1	15622	200	200	225	100	200	3.8	6.75	7.00
	2003	2	2	55	37.4	12040	378	343	25	20	398	17.0	6.00	-
	2004	-	-	-	-	-	-	-	-	-	-	-	-	-
SMBPB	1996	10	9	47	33.8	20859	460	446	225	50	572	1.8	8.67	7.92
	1997	15	15	48	31.7	21190	4401	3836	403	82	4474	21.1	8.19	7.78
	1998	15	13	47	29.4	19464	1727	2281	790	99	1736	10.8	2.60	6.00
	1999	3	2	47	17.0	16354	186	330	0	-	186	13.0	5.00	2.00
	2000	1	1	57	17.2	13796	400	447	105	90	411	24.0	5.00	7.33
	2001	2	2	59	21.2	19314	430	451	100	95	435	5.5	7.67	8.60
	2002	8	8	49	37.3	20655	1440	1397	1050	98	1458	6.9	9.13	7.00
	2003	9	4	50	39.9	20367	467	925	165	98	471	7.5	6.00	7.71
	2004	11	10	51	27.2	13565	1272	1239	2	100	1272	8.7	8.38	-

Table 16. Mean weights at age (g) of spring-spawning herring, from samples collected January to June, by stock area, 1998 – 2003. Sample sizes in parenthesis.

Stock	Age	1998		1999		2000		2001		2002		2003	
WB-NDB	1	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	78	(1)
	3	112	(33)	-	-	116	(6)	134	(12)	126	(74)	134	(68)
	4	147	(375)	155	(277)	170	(37)	149	(204)	195	(26)	162	(774)
	5	170	(1)	176	(363)	193	(184)	185	(51)	206	(33)	198	(41)
	6	201	(3)	216	(5)	214	(130)	215	(325)	260	(15)	217	(98)
	7	227	(42)	245	(3)	261	(2)	238	(120)	276	(20)	245	(16)
	8	237	(160)	254	(58)	302	(2)	265	(2)	283	(15)	258	(58)
	9	248	(5)	259	(85)	300	(4)	330	(3)	341	(3)	266	(24)
	10	283	(21)	294	(12)	320	(6)	327	(2)	299	(3)	272	(10)
	11+	363	(185)	340	(78)	378	(44)	336	(5)	397	(49)	332	(11)
BB-TB	1	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	101	(4)	97	(1)	-	-	-	-
	3	143	(12)	168	(1)	139	(4)	145	(45)	136	(90)	147	(26)
	4	172	(60)	187	(262)	186	(26)	164	(44)	186	(124)	183	(793)
	5	219	(2)	207	(108)	225	(209)	194	(24)	196	(41)	218	(187)
	6	238	(18)	234	(6)	243	(122)	243	(182)	239	(19)	227	(71)
	7	245	(746)	246	(12)	251	(15)	261	(72)	269	(72)	284	(22)
	8	254	(59)	275	(574)	276	(8)	283	(12)	277	(21)	280	(52)
	9	256	(2)	282	(26)	312	(450)	288	(18)	288	(10)	294	(42)
	10	293	(16)	287	(4)	325	(50)	304	(106)	301	(9)	323	(25)
	11+	339	(74)	340	(34)	332	(53)	328	(208)	328	(165)	353	(231)
SMB-PB	1	-	-	-	-	-	-	-	-	-	-	-	-
	2	79	(7)	157	(4)	113	(6)	79	(5)	94	(3)	120	(6)
	3	130	(161)	143	(266)	135	(56)	138	(15)	136	(225)	148	(10)
	4	178	(37)	175	(72)	170	(219)	166	(16)	175	(5)	181	(415)
	5	205	(4)	198	(27)	192	(50)	189	(170)	202	(19)	208	(17)
	6	258	(37)	-	-	228	(130)	244	(104)	230	(150)	240	(10)
	7	286	(376)	264	(50)	239	(7)	266	(32)	257	(41)	246	(212)
	8	300	(57)	309	(147)	271	(38)	289	(13)	278	(10)	274	(18)
	9	328	(14)	298	(17)	300	(53)	280	(25)	304	(5)	309	(14)
	10	326	(7)	322	(8)	306	(24)	312	(37)	301	(18)	322	(6)
	11+	424	(68)	394	(57)	352	(66)	341	(120)	354	(102)	368	(113)
FB	1	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	79	(10)	-	-	-	-
	3	99	(1)	103	(787)	-	-	128	(2)	138	(12)	134	(2)
	4	186	(2)	152	(38)	148	(94)	177	(7)	162	(2)	171	(69)
	5	-	-	185	(23)	186	(25)	179	(365)	175	(6)	197	(3)
	6	227	(302)	217	(18)	218	(9)	214	(69)	221	(373)	210	(19)
	7	250	(71)	249	(285)	226	(8)	251	(57)	264	(35)	241	(592)
	8	281	(90)	279	(113)	255	(126)	260	(60)	284	(15)	268	(39)
	9	292	(11)	303	(37)	296	(137)	278	(133)	307	(11)	305	(8)
	10	320	(13)	323	(17)	311	(36)	303	(75)	300	(38)	307	(3)
	11+	360	(185)	373	(242)	361	(232)	338	(287)	357	(377)	347	(335)

Table 17. Performance report standardization parameters, ranks, and weighting factors.

Data Source	Calculation of Ranks	Minimum Rank	Maximum Rank	Weighting Factor	Indicator of:
Research Gill Net Catch Rates (year = n)	<= 20% of mean = 1 21 - 40% of mean = 2 41- 60% of mean = 3 61 - 80% of mean = 4 81 - 100% of mean = 5 101 - 120% of mean = 6 121 - 140% of mean = 7 141 - 160% of mean = 8 161 - 180% of mean = 9 > 180% of mean = 10	1	10	2.0	Current Status
Commercial Gill Net Catch Rates (year = n)	<= 20% of mean = 1 21 - 40% of mean = 2 41- 60% of mean = 3 61 - 80% of mean = 4 81 - 100% of mean = 5 101 - 120% of mean = 6 121 - 140% of mean = 7 141 - 160% of mean = 8 161 - 180% of mean = 9 > 180% of mean = 10	1	10	0.5	Current Status
Gill Net Fisher Observations (year = n)	very poor = 1 average = 5 very good = 10	1	10	0.5	Current Status
Purse Seine Fisher Observations (year = n – 1)* * except SMBPB where year = n	very poor = 1 average = 5 very good = 10	1	10	2.0	Current Status
Research Gill Net Age Compositions (year = n - 1) (number of age 3+ groups >= 5% of catch)	very poor if n = 1 average if n = 5 very good if n = 9	1	9	0.5	Current Status
Current Year Classes (n - 10 to n - 6) (number of mature year classes greater than mean strength)	very poor if n = 1 average if n = 3 to 4 very good if n = 6	1	6	1.0	Prospects
Recruitment (year class = n – 5)	<= 20% of mean = 1 21 - 40% of mean = 2 41- 60% of mean = 3 61 - 80% of mean = 4 81 - 100% of mean = 5 101 - 120% of mean = 6 121 - 140% of mean = 7 141 - 160% of mean = 8 161 - 180% of mean = 9 > 180% of mean = 10	1	10	1.0	Prospects

Table 18. Performance report indices of current status and prospects (standardized and weighted), by stock area, 1998 – 2004.

	WB-NDB				BB-TB				SMB-PB				FB			
	2004	2002	2000	1998	2004	2002	2000	1998	2004	2002	2000	1998	2004	2002	2000	1998
Research Gill Net Catch Rates	0.27	0.08	0.11	0.48	1.07	0.19	0.31	0.58	0.68	2.83	1.08	0.71	0.43	0.84	1.25	2.19
Comm. Gill Net Catch Rates	1.07	0.10	0.87	0.50	0.36	0.35	1.16	0.43	0.28	1.91	0.53	0.84	0.55	1.04	1.65	1.25
Gill Net Fisher Observations	3.78	2.30	2.69	3.00	2.75	2.50	4.27	5.00	3.50	5.00	4.00	2.57	4.33	6.71	8.45	7.40
Purse Seine Fisher Obser.	9.00		8.50	6.92	6.00	7.75	5.79	6.93	8.38	9.13	5.00	2.60	-	-	-	-
Research Gill Net Age Comp.	5	4	5	5	6	8	6	4	5	6	8	4	3	7	5	5
Current Year Classes	2	3	3	4	2	2	2	4	2	5	4	4	2	4	4	6
Recruitment	1.31	1.14	1.22	0.13	1.89	0.61	1.36	-2.50	2.50	0.95	1.76	-0.77	1.19	0.05	1.45	-2.31
Current Status:	0.60	0.20	0.39	0.43	0.60	0.41	0.43	0.43	0.61	0.87	0.58	0.38	0.29	0.60	0.69	0.83
Prospects:	0.56	0.56	0.63	0.31	0.75	0.38	0.56	0.31	0.75	0.63	0.81	0.31	0.50	0.31	0.75	0.75

Table 19. Application of the Precautionary Approach to performance reports based upon current year research gill net catch rates in relation to mean research gill net catch rates.

	Level of Concern	**Measure of Concern**
Area of Concern	Very High Risk	<= 2.5% of mean
	High Risk	2.6% to 5.0% of mean
	Medium Risk	5.1% to 7.5% of mean
	Low Risk	7.6% to 10.0% of mean
	Limit Reference Point	
Area of No Concern	Very Low Risk	10.1% to 30.0% of mean
	No Risk	> 30.0% of mean

Table 20. White Bay – Notre Dame Bay performance table to the spring of 2004.

The Fishery	Observation		
Reported Landings: 2002 - 2003	Landings decreased from 358 t in 2002 to 332 t in 2003; 30% of the TAC was taken in 2003; average landings of 2800 t during 1990's; peak landings of 15,700 t in 1979.		
Total Removals: 2003	In addition to reported landings in 2003, an unknown amount of herring (considered to be less than 500 t) was caught in the gill net bait fishery; mortality from discards in the purse seine fishery, due to damaged gear and quota restrictions, was reported by fishers to be approximately 115 t.		
Effort: 2003 and 2004	Documented effort has declined since the 1980's; purse seine effort decreased by 90% from 1997 to 2003; gill net effort has also decreased by 87% from 1996 to 2004.		
Geographic Distribution of Fishery	The 2003 purse seine fishery, in November and December, was entirely in the Fogo Island area. The 2004 gill net fishery, from late April to late June, was mostly in eastern Notre Dame Bay.		
Abundance Indices	**Observation**	**Interpretation**	**Evaluation**
Research Gill Net Catch Rates 1988 – 2004 (numbers / nights fished)	Increased by 340% from 2002 to 2004; 2004 = 99, mean = 366, maximum = 859.	Current abundance below average and increasing.	+
Commercial Gill Net Catch Rates 1996 – 2004 (kg / net / nights fished)	Increased by 1118% from 2002 to 2004; 2004 = 25, mean = 23, maximum = 38.	Current abundance average and increasing.	+
Gill Net Fisher Observations 1996 - 2004	Abundance perceived to be higher in 2004 than in 2002 but still below average.	Current abundance below average and increasing.	+
Purse Seine Fisher Observations 1996 - 2003	Abundance perceived to be higher in 2003 than in 2002 and above average.	Abundance in 2003 high and increasing.	+
Biological Characteristics	**Observation**	**Interpretation**	**Evaluation**
2003 Research Gill Net Age Compositions (ages 3+)	Dominated by the 1999 year class; 5 year classes each account for >5% of catch.	Population age structure considered to be stable.	+
Current Year Classes: 1993 to 1998 Time series: 1982 - 1999 year classes	4 of 6 current mature year classes below average.	Most current mature year classes below average and considered to be weak.	
Recruitment: 1999 year class Time series: 1982 to 1999 year classes	1999 year class above average.	Above average recruitment of the most recent estimatible year class.	+
Mean Weight: (ages 4 to 10) 1983 - 2003	Increasing trend since 1998 but still below average; 2003 = 231, mean = 259, maximum = 323.	Potential increase in fishing mortality per tonne caught.	?
Ecological Considerations	**Observation**	**Interpretation**	**Evaluation**
Predation	As in 2002, proportion of herring in harp seal diet has increased in near shore areas since the 1980's; no other predation data available.	Increased mortality by harp seals; other changes in predation mortality unknown.	?
Water Temperature: 1983 - 2003 (at 20 m, Station 27 off St. John's)	Above average in 2003 (4.44); mean = 3.64, maximum = 4.71.	Recent higher temperatures may enhance recruitment.	?
Water Salinity: 1983 - 2003 (at 20 m, Station 27 off St. John's)	Increasing trend since 2001 and above average in 2003 (32.00); mean = 31.79, maximum = 32.18	Recent higher salinities may enhance recruitment.	?

STOCK STATUS	Interpretation	Evaluation
Current	Current abundance has increased since 2002 but is still low; population age structure is considered to be stable.	+
Prospect	Most current mature year classes are considered to be weak; above average recruitment of the 1999 year class.	?
Level of Concern (Precautionary Approach)	As an index of abundance, the 2004 research gill net catch rate implies very low risk of serious harm.	low risk

	Concern for Current Status or Prospect
?	Uncertainty of Interpretation
+	Positive Evaluation

All available data indicate that this stock has increased since 2002 but is still at a low level. The current status has improved since the last assessment in 2002. Prospects are uncertain; although the 1999 year class is above average, most mature year classes are below average and are considered to be weak. Prospects are similar to 2002.

Table 21. Bonavista Bay – Trinity Bay performance table to the spring of 2004.

The Fishery	**Observation**		
Reported Landings: 2002 - 2003	Landings increased from 566 t in 2002 to 1029 t in 2003; 34% of the TAC was taken in 2003; average landings of 2600 t during 1990's; peak landings of 12,000 t in 1977.		
Total Removals: 2003	In addition to reported landings in 2003, an unknown amount of herring (considered to be less than 300 t) was caught in the gill net bait fishery; mortality from discards in the purse seine fishery, due entirely to quota restrictions, was reported by fishers to be approximately 20 t.		
Effort: 2003 and 2004	Documented effort was less in the 1990's than in the 1980's; gill net effort has continued to decline, by 85% from 1996 to 2004; purse seine effort decreased by 46% from 2001 to 2003.		
Geographic Distribution of Fishery	The 2003 purse seine fishery, in October through December, was concentrated in the northern part of Bonavista Bay. The 2004 gill net fishery, from mid April to late June, was distributed throughout Bonavista and Trinity Bays.		
Abundance Indices	**Observation**	**Interpretation**	**Evaluation**
Research Gill Net Catch Rates 1988 - 2004 (numbers / nights fished)	Increased by 527% from 2002 to 2004; 2004 = 121, mean = 113, maximum = 279.	Current abundance average and increasing.	+
Commercial Gill Net Catch Rates 1996 – 2004 (kg / net / nights fished)	Decreased by 9% from 2002 to 2004; 2004 = 9, mean = 26, maximum = 57.	Current abundance below average and decreasing.	-
Gill Net Fisher Observations 1996 - 2004	Abundance perceived to be higher in 2004 than in 2002 but still below average.	Current abundance below average and increasing.	+
Purse Seine Fisher Observations 1996 - 2003	Abundance perceived to be lower in 2003 than in 2002 but still above average.	Abundance in 2003 above average and decreasing.	-
Biological Characteristics	**Observation**	**Interpretation**	**Evaluation**
2003 Research Gill Net Age Compositions (ages 3+)	Dominated by the 1999 year class; 6 year classes each account for >5% of catch.	Population age structure considered to be stable.	+
Current Year Classes: 1993 to 1998 Time series: 1982 to 1999 year classes	4 of 6 current mature year classes below average.	Most current mature year classes below average and considered to be weak.	-
Recruitment: 1999 year class Time series: 1982 to 1999 year classes	1999 year class well above average.	Above average recruitment of the most recent estimatible year class.	+
Mean Weight: (ages 4 to 10) 1983 - 2003	Increasing trend since 1996 but still below average; 2003 = 258, mean = 268, maximum = 340.	Potential increase in fishing mortality per tonne caught.	?
Ecological Considerations	**Observation**	**Interpretation**	**Evaluation**
Predation	As in 2002, proportion of herring in harp seal diet has increased in near shore areas since the 1980's; no other predation data available.	Increased mortality by harp seals; other changes in predation mortality unknown.	?
Water Temperature: 1983 - 2003 (at 20 m, Station 27 off St. John's)	Above average in 2003 (4.44); mean = 3.64, maximum = 4.71.	Recent higher temperatures may enhance recruitment.	?
Water Salinity: 1983 - 2003 (at 20 m, Station 27 off St. John's)	Increasing trend since 2001 and above average in 2003 (32.00); mean = 31.79, maximum = 32.18	Recent higher salinities may enhance recruitment.	?

STOCK STATUS	**Interpretation**	**Evaluation**
Current	Current abundance has increased since 2002 but is still low; population age structure is considered to be stable.	+
Prospect	Most current mature year classes are considered to be weak; above average recruitment of the 1999 year class.	?
Level of Concern (Precautionary Approach)	As an index of abundance the 2004 research gill net catch rate implies no risk of serious harm.	no risk

-	Concern for Current Status or Prospect
?	Uncertainty of Interpretation
+	Positive Evaluation

Most available data indicate that this stock has increased since 2002 but is still at a low level. The current status has improved since the last assessment in 2002. Prospects are uncertain; although the 1999 year class is well above average, most mature year classes are below average and are considered to be weak. The prospects have improved since the last assessment in 2002.

Table 22. St. Mary's Bay – Placentia Bay performance table to the spring of 2004.

The Fishery	Observation		
Reported Landings: 2002 - 2003	Landings decreased from 1568 t in 2002 to 1084 t in 2003; 43% of the TAC was taken in 2003; average landings of 1200 t during 1990's; peak landings of 4000 t in 1997 (since large mobile purse seine fishery in 1960's).		
Total Removals: 2003	In addition to reported landings in 2003, an unknown amount of herring (considered to be less than 150 t) was caught in the gill net bait fishery; fishers reported minimal discard mortality in the purse seine fishery.		
Effort: 2004	Documented effort increased from the 1980's to the 1990's; purse seine effort peaked in 1997 and has since declined by 59% from 1997 to 2004; gill net effort peaked in 1998 and has since declined by 94% from 1998 to 2004.		
Geographic Distribution of Fishery	The purse seine fishery, in March 2004, was concentrated along the eastern side of Placentia Bay and St. Mary's Bay. The 2004 gill net fishery, from early April to mid June, was mostly in Placentia Bay.		
Abundance Indices	**Observation**	**Interpretation**	**Evaluation**
Research Gill Net Catch Rates 1982 – 2004 (numbers / nights fished)	Decreased by 68% from 2002 to 2004; 2004 = 84, mean = 124, maximum = 266.	Current abundance below average and decreasing.	
Commercial Gill Net Catch Rates 1996 – 2004 (kg / net / nights fished)	Decreased by 86% from 2002 to 2004 (2004 = 2 logbooks) ; 2004 = 5, mean = 19, maximum = 39.	Current abundance below average and decreasing.	
Gill Net Fisher Observations 1996 – 2004	Abundance perceived to be lower in 2004 than in 2002 and below average.	Current abundance below average and decreasing.	
Purse Seine Fisher Observations 1996 – 2004	Abundance perceived to be lower in 2004 than in 2002 but still above average.	Current abundance above average and decreasing.	
Biological Characteristics	**Observation**	**Interpretation**	**Evaluation**
2003 Research Gill Net Age Compositions (ages 3+)	Dominated by the 1999 year class; 5 year classes each account for >5% of catch.	Population age structure considered to be stable.	+
Current Year Classes: 1993 to 1998 Time series: 1976 to 1999 year classes	3 of 6 current mature year classes below average.	Half of current mature year classes below average and considered to be weak.	
Recruitment: 1999 year class Time series: 1976 to 1999 year classes	1999 year class well above average.	Above recruitment of the most recent estimatible year class.	+
Mean Weight: (ages 4 to 10) 1983 – 2003	Decreasing trend since 1983; below average in 2003 (254); mean = 284, maximum = 332.	Potential increase in fishing mortality per tonne caught.	?
Ecological Considerations	**Observation**	**Interpretation**	**Evaluation**
Water Temperature: 1983 - 2003 (at 20 m, Station 27 off St. John's)	Above average in 2003 (4.44); mean = 3.64, maximum = 4.71.	Recent higher temperatures may enhance recruitment.	?
Water Salinity: 1983 - 2003 (at 20 m, Station 27 off St. John's)	Increasing trend since 2001 and above average in 2003 (32.00); mean = 31.79, maximum = 32.18	Recent higher salinities may enhance recruitment.	?

STOCK STATUS	**Interpretation**	**Evaluation**
Current	Current abundance has decreased since 2002; population age structure is considered to be stable.	
Prospect	Most current mature year classes are considered to be weak; above average recruitment of the 1999 year class.	?
Level of Concern (Precautionary Approach)	As an index of abundance, the 2004 research gill net catch rate implies no risk of serious harm..	no risk

	Concern for Current Status or Prospect
?	Uncertainty of Interpretation
+	Positive Evaluation

All available data indicate that this stock has decreased since 2002. The current status has deteriorated since the last assessment in 2002. Prospects are uncertain; although the 1999 year class is well above average, most mature year classes are below average and are considered to be weak. Prospects have improved since 2002.

Table 23. Fortune Bay performance table to the spring of 2004.

The Fishery	**Observation**		
Reported Landings: 2002 - 2003	Landings increased from 2259 t in 2002 to 3392 t in 2003; 92% of the TAC was taken in 2003; average landings of 200 t during 1990's; peak landings in 2003 (since large mobile purse seine fishery in 1960's).		
Total Removals: 2003	In addition to reported landings in 2003, an unknown amount of herring (considered to be less than 400 t) was caught in the gill net bait fishery.		
Effort: 2004	Documented effort in 1980's and 1990's was very low; gill net effort peaked in 1997 and has since declined by 88% from 1997 to 2004; there is no purse seine fishery in Fortune Bay; the current fishery is primarily by bar seine for which no effort information is available.		
Geographic Distribution of Fishery	The 2004 spring bar seine fishery was concentrated in the Long Harbour area; the gill net fishery, from late March to mid June, was distributed throughout Fortune Bay.		
Abundance Indices	**Observation**	**Interpretation**	**Evaluation**
Research Gill Net Catch Rates 1982 – 2004 (numbers / nights fished)	Decreased by 44% from 2002 to 2004; 2004 = 249, mean = 581, maximum = 1224.	Current abundance below average and decreasing.	-
Commercial Gill Net Catch Rates 1996 – 2004 (kg / net / nights fished)	Decreased by 51% from 2002 to 2004; 2004 = 24.6, mean = 45, maximum = 84.	Current abundance below average and decreasing.	-
Gill Net Fisher Observations 1996 – 2004 time series	Abundance perceived to be lower in 2004 than in 2002 and below average.	Current abundance below average and decreasing.	-
Biological Characteristics	**Observation**	**Interpretation**	**Evaluation**
2003 Research Gill Net Age Compositions (ages 3+)	Dominated by the 1996 year class; 3 year classes each account for >5% of the catch; fish aged 11+ well represented.	Population age structure considered to be stable due to substantial contribution of older fish.	+
Current Year Classes: 1993 to 1998 Time series: 1976 to 1999 year classes	3 of 6 current mature year classes below average.	Half of current mature year classes below average and considered to be weak.	-
Recruitment: 1999 year class Time series: 1976 to 1999 year classes	1999 year class above average.	Above average recruitment of the most recent estimatible year class.	+
Mean Weight: (ages 4 to 10) 1983 – 2003	Decreasing trend from 1983 to 2001; below average in 2003 (243); mean = 275, maximum = 336.	Potential increase in fishing mortality per tonne caught.	?
Ecological Considerations	**Observation**	**Interpretation**	**Evaluation**
Water Temperature: 1983 - 2003 (at 20 m, Station 27 off St. John's)	Above average in 2003 (4.44); mean = 3.64, maximum = 4.71.	Recent higher temperatures may enhance recruitment.	?
Water Salinity: 1983 - 2003 (at 20 m, Station 27 off St. John's)	Increasing trend since 2001 and above average in 2003 (32.00); mean = 31.79, maximum = 32.18	Recent higher salinities may enhance recruitment.	?

STOCK STATUS	**Interpretation**	**Evaluation**
Current	Current abundance has decreased since 2002; population age structure is considered to be stable.	-
Prospect	Most current mature year classes are considered to be weak; above average recruitment of the 1999 year class.	?
Level of Concern (Precautionary Approach)	As an index of abundance, the 2004 research gill net catch rate implies no risk of serious harm.	no risk

-	Concern for Current Status or Prospect
?	Uncertainty of Interpretation
+	Positive Evaluation

All available data indicate that this stock has decreased since 2002. Current status has deteriorated since the last assessment in 2002. Prospects are uncertain; although the 1999 year class is above average, most mature year classes are below average and are considered to be weak. Prospects have improved since 2002.

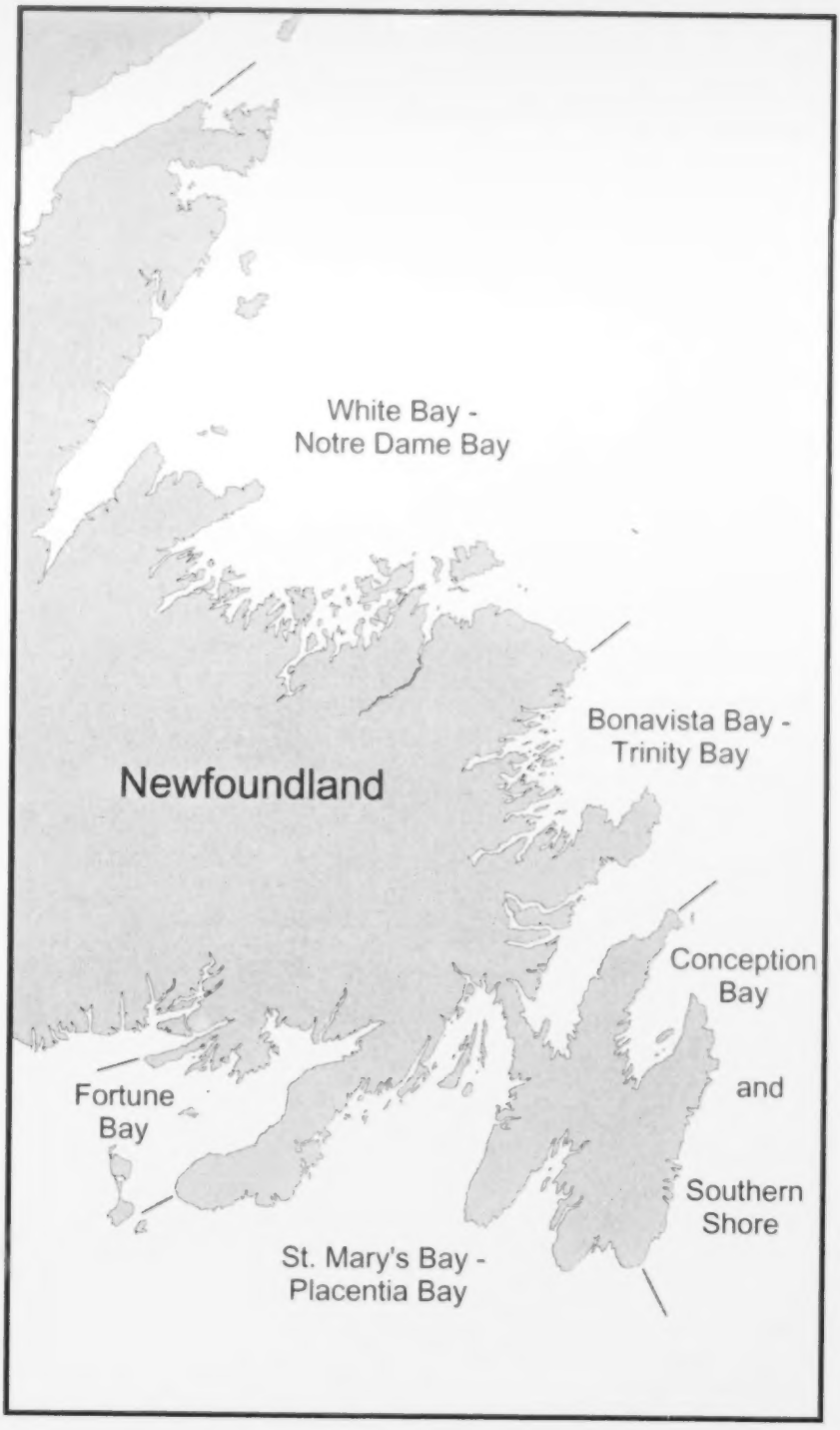


Figure 1. Area map indicating herring stock complexes within the Newfoundland and Labrador Region.

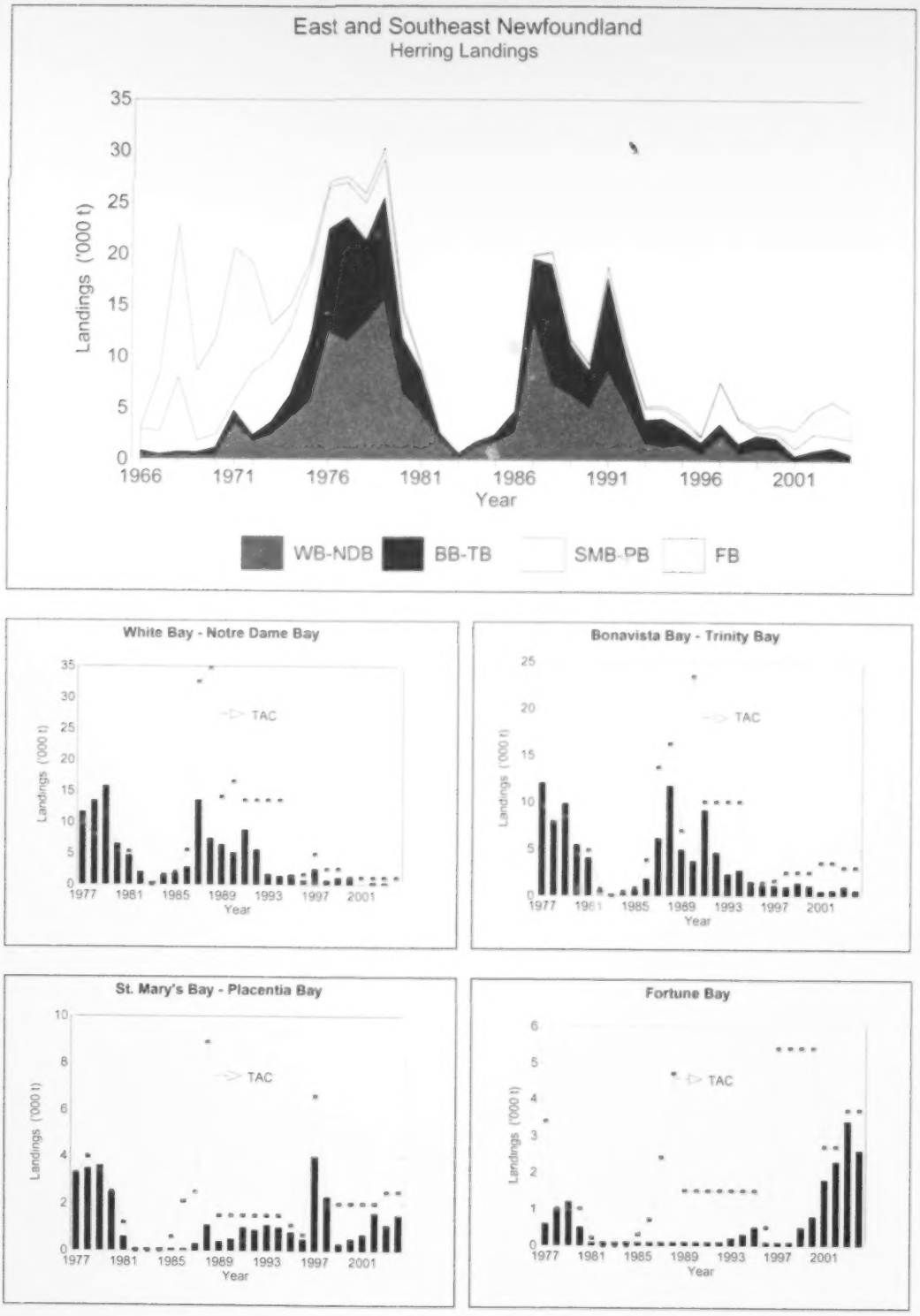


Figure 2. East and southeast Newfoundland herring landings and TAC's, by stock area.

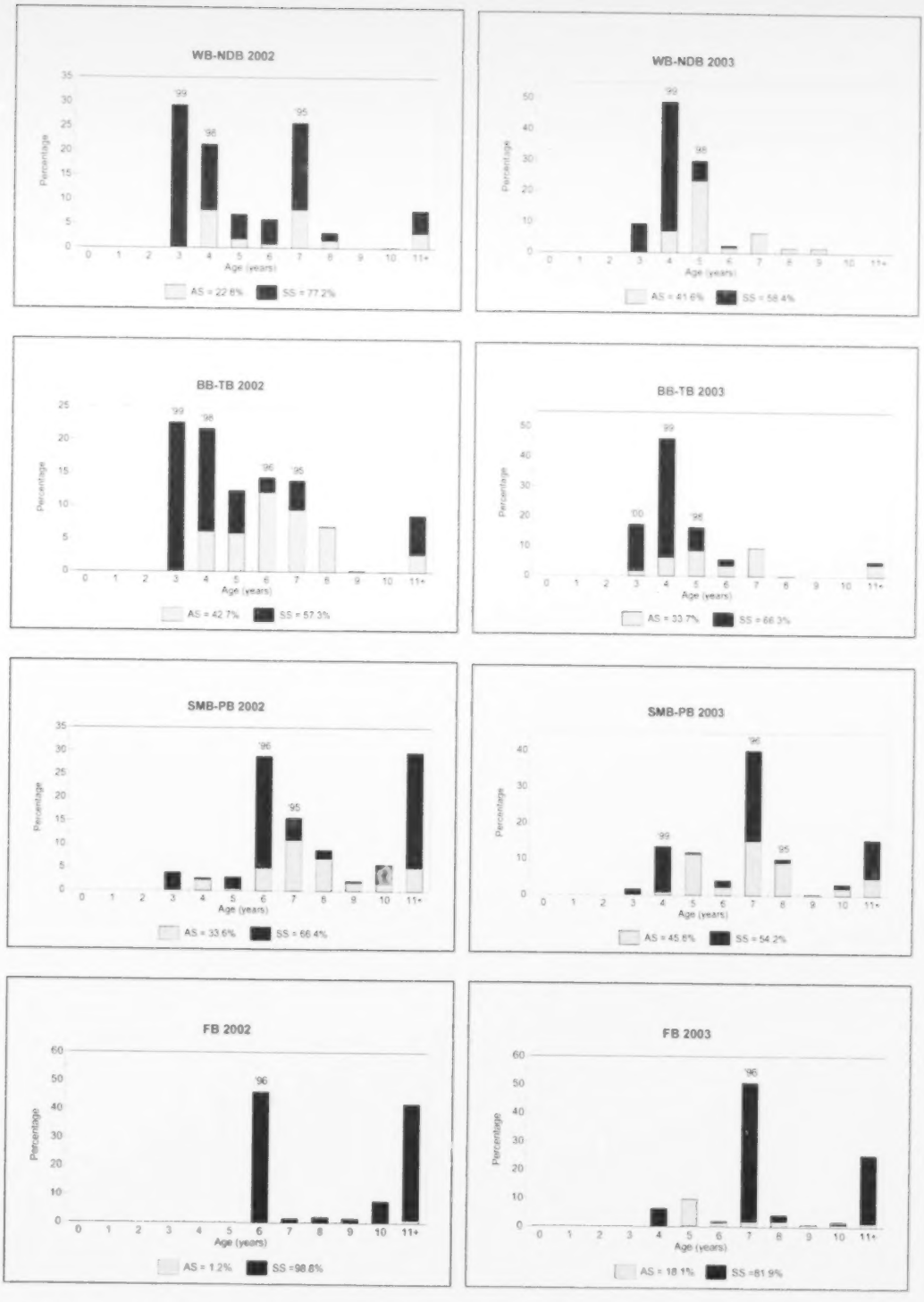


Figure 3. Age distribution of herring from the commercial fishery, by stock area, 2002 and 2003.

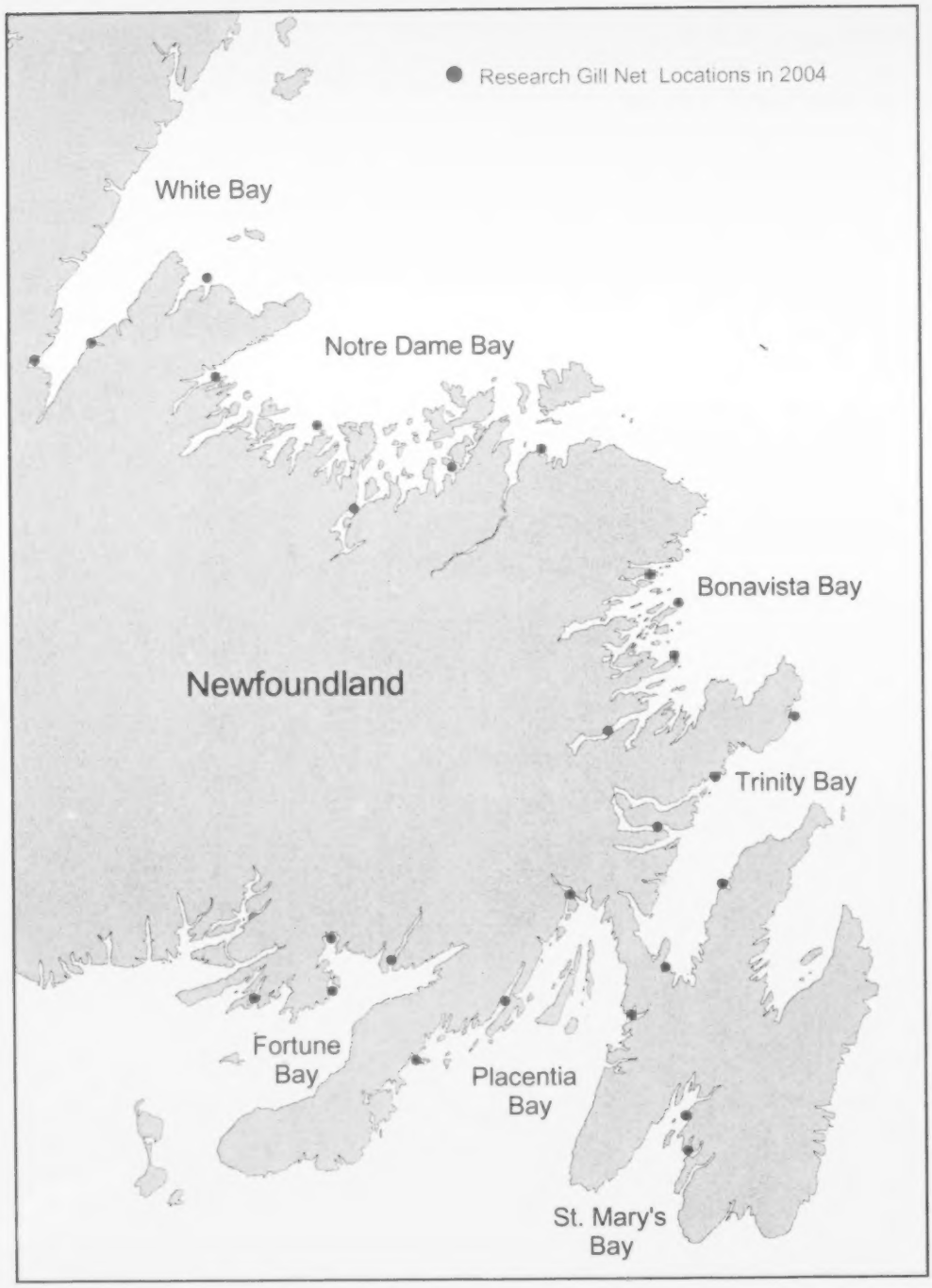


Figure 4. Herring research gill net locations, by stock area, in 2004.

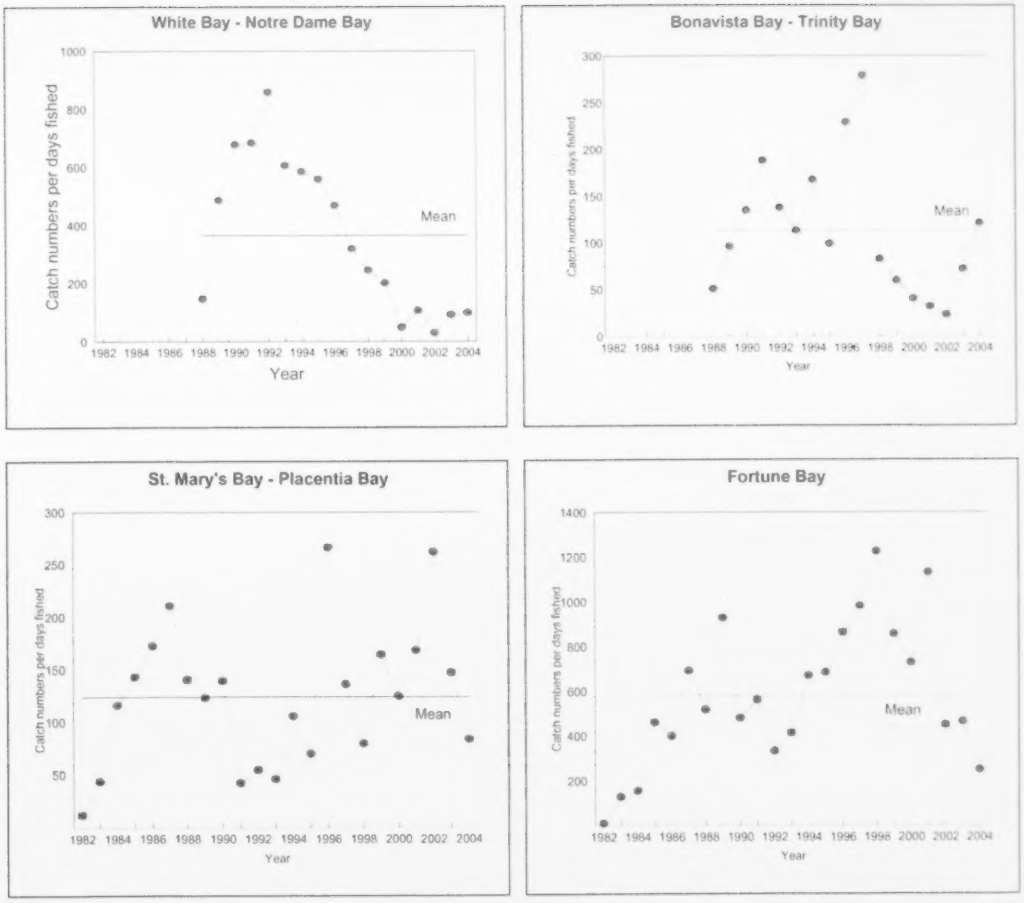


Figure 5. Research gill net catch rates (numbers per nights fished), spring spawners only, by stock area and year.

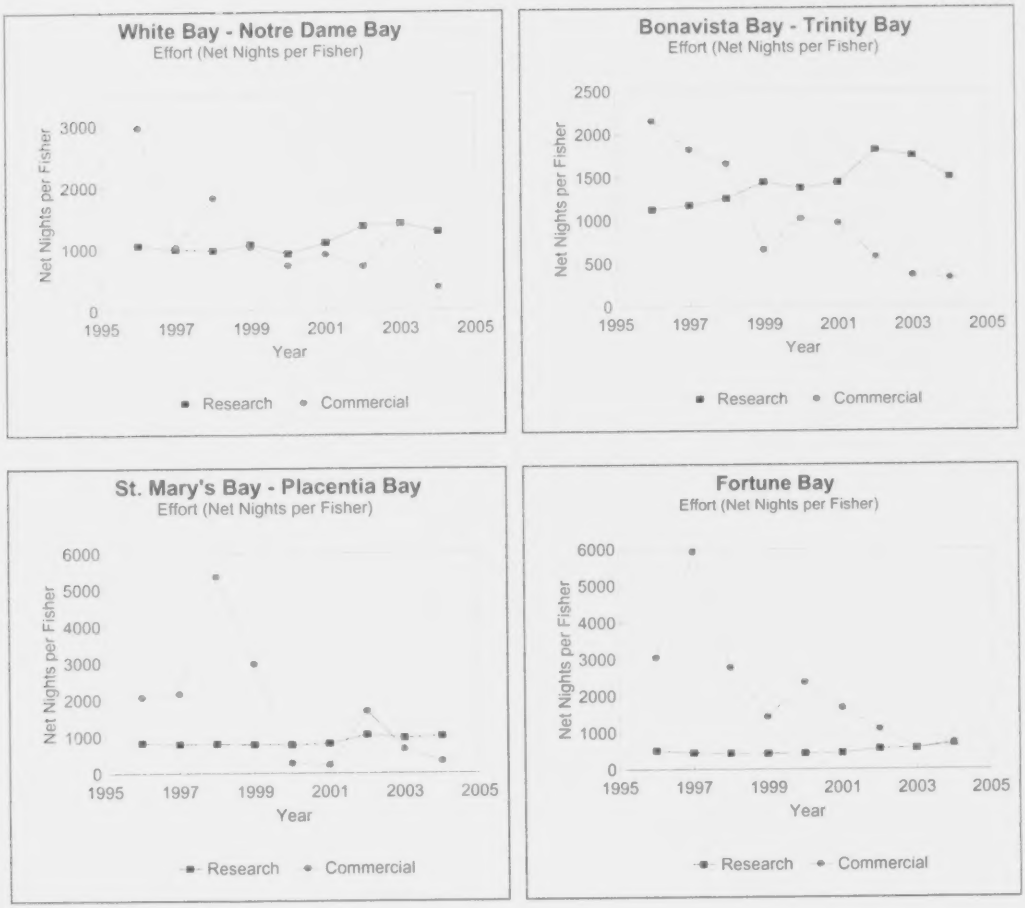


Figure 6. Comparison of effort (net nights per fisher) for commercial and research gill net data, by stock area, 1996 – 2004.

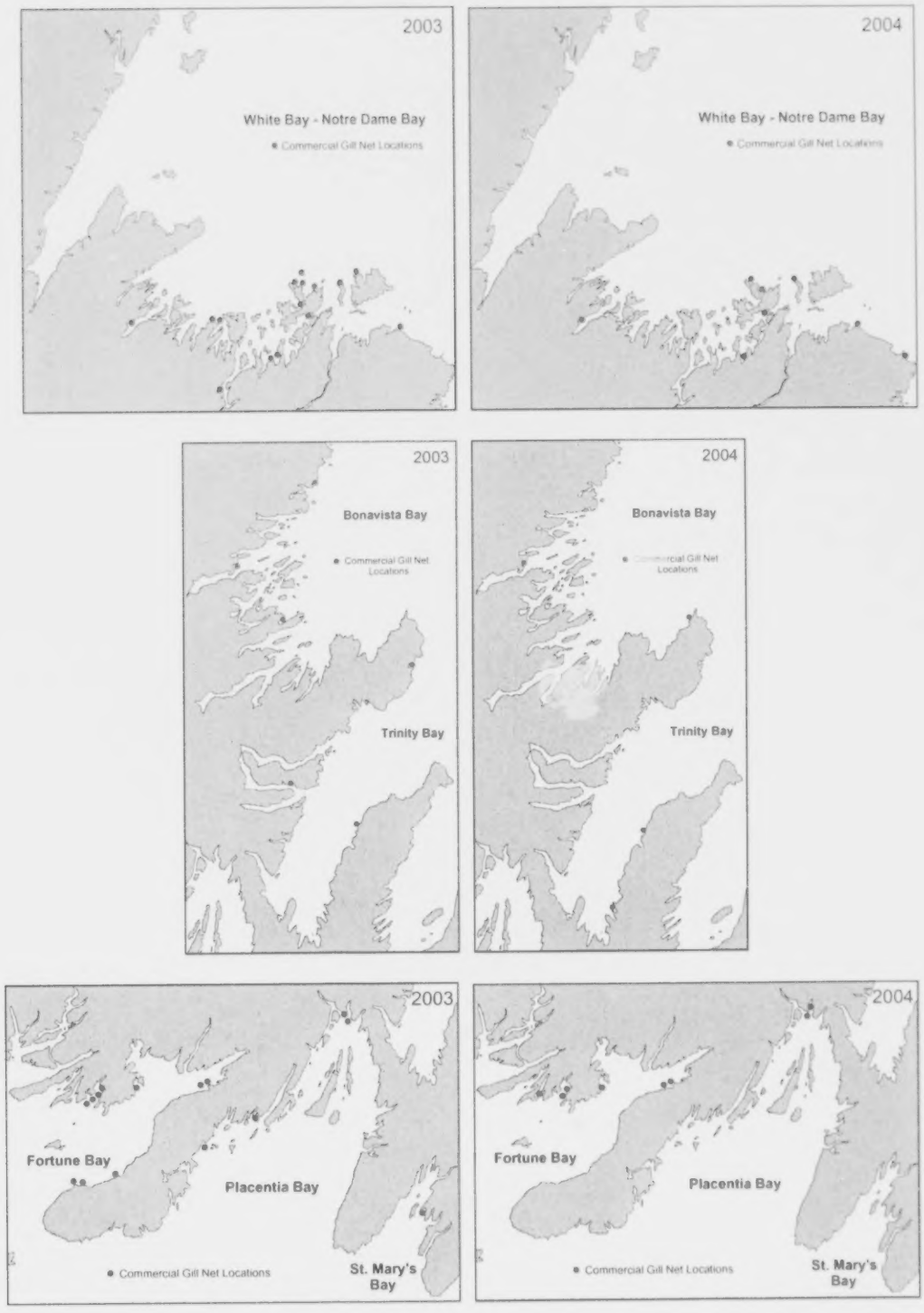


Figure 7. Commercial herring gill net set locations from logbooks, by stock area, 2003 and 2004.

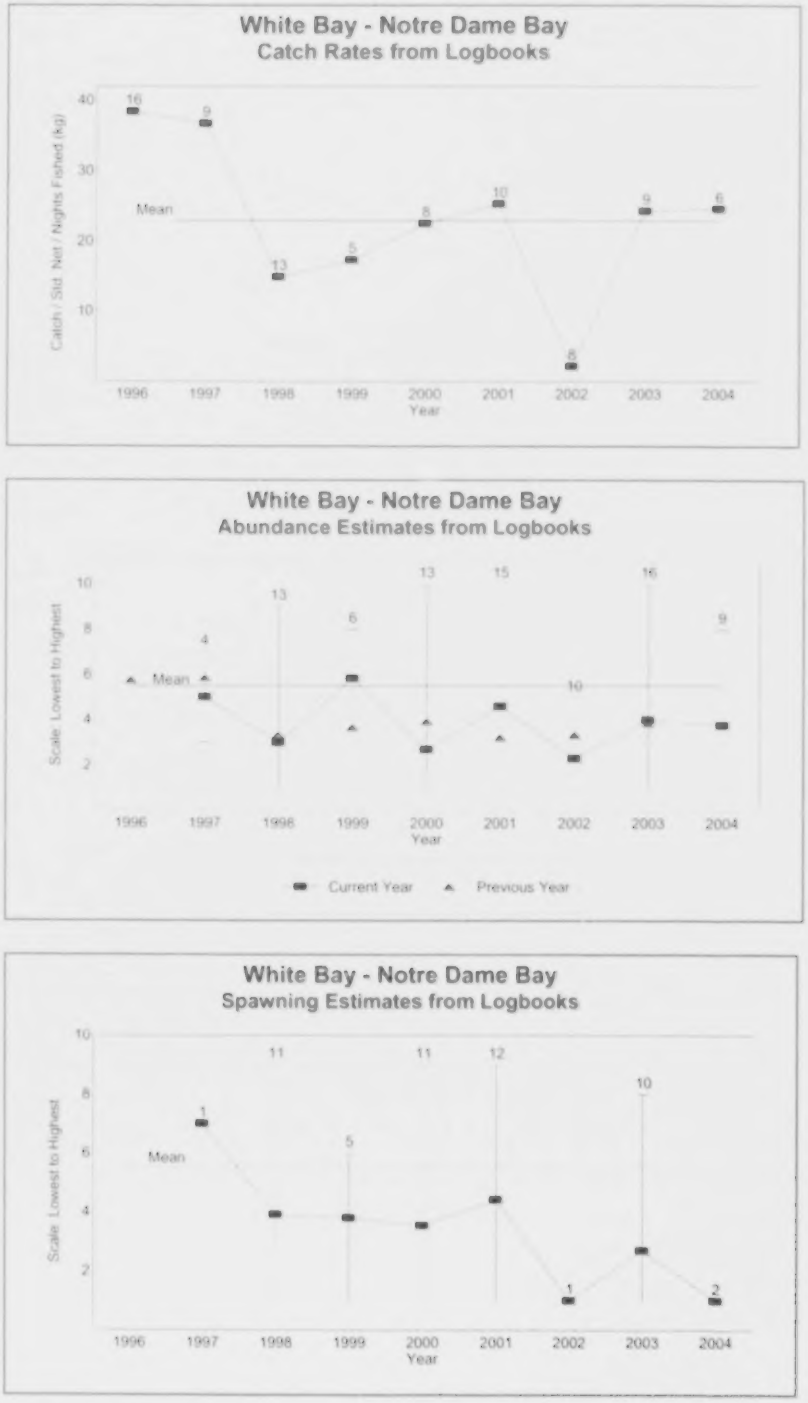
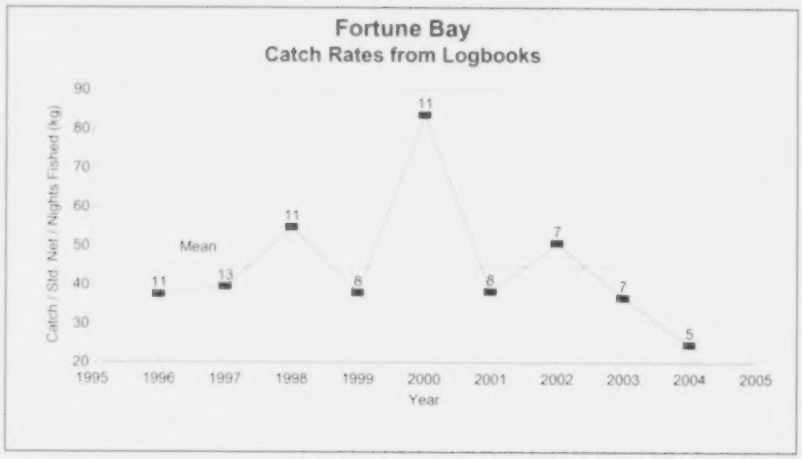
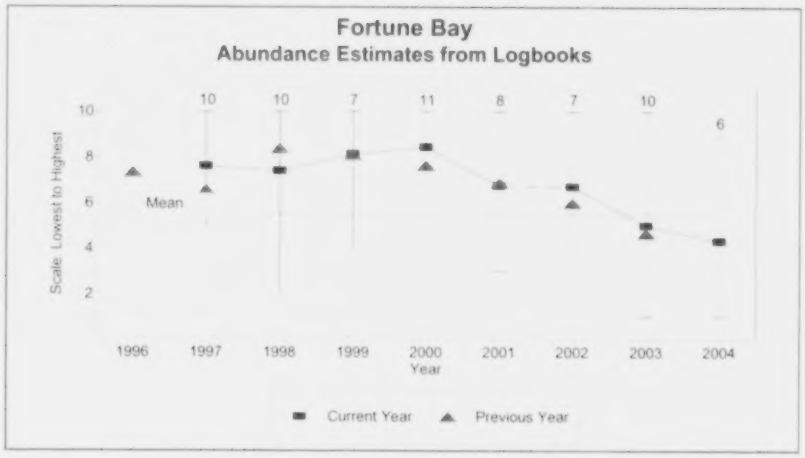


Figure 8. Abundance indices from commercial gill net logbooks for White Bay – Notre Dame Bay, 1996 - 2004. Solid squares represent means, vertical lines represent the range of responses, and sample sizes are listed at the top.

Figure 9. Abundance indices from commercial gill net logbooks for Bonavista Bay – Trinity Bay, 1996 – 2004. Solid squares represent means, vertical lines represent the range of responses, and sample sizes are listed at the top.

Figure 10. Abundance indices from commercial gill net logbooks for St. Mary's Bay – Placentia Bay, 1996 – 2004. Solid squares represent means, vertical lines represent the range of responses, and sample sizes are listed at the top.





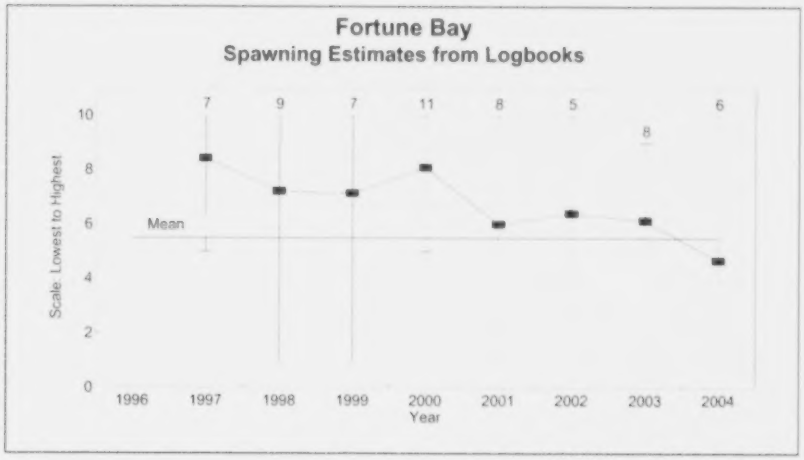


Figure 11. Abundance indices from commercial gill net logbooks for Fortune Bay, 1996 -2004. Solid squares represent means, vertical lines represent the range of responses, and sample sizes are listed at the top.

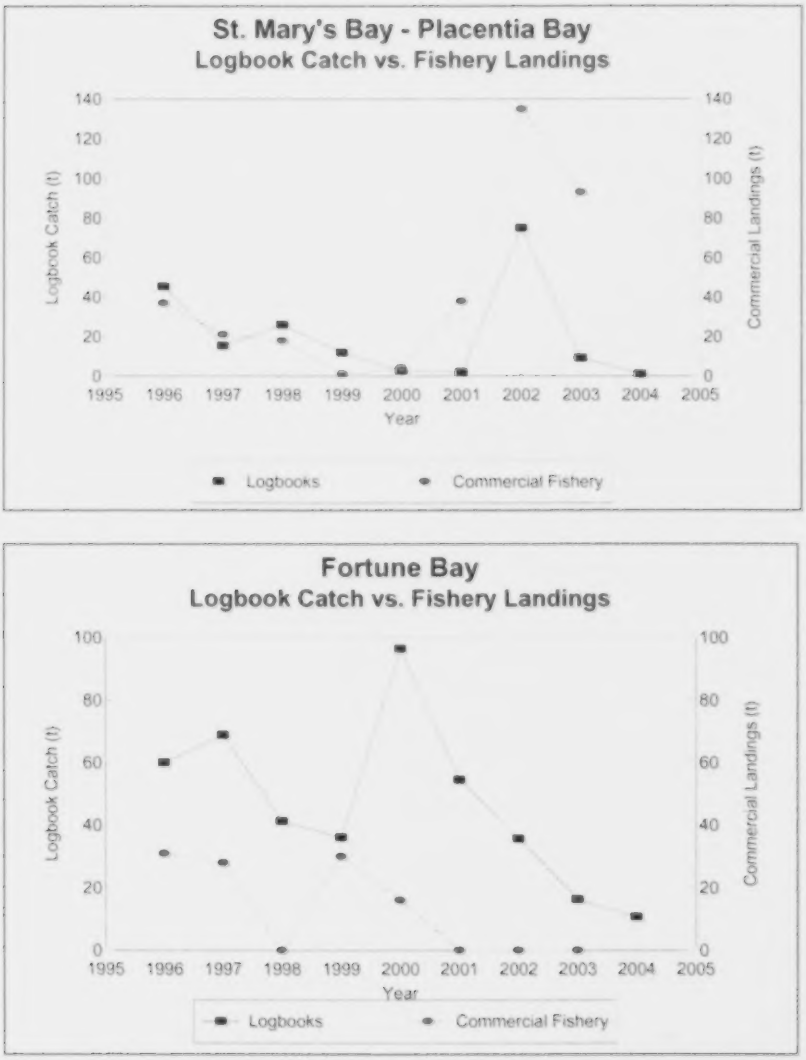


Figure 12. Comparison of catch (t) from commercial gill net logbooks and landings (t) from the commercial gill net fishery, for St. Mary's Bay – Placentia Bay and Fortune Bay, 1996 – 2004.

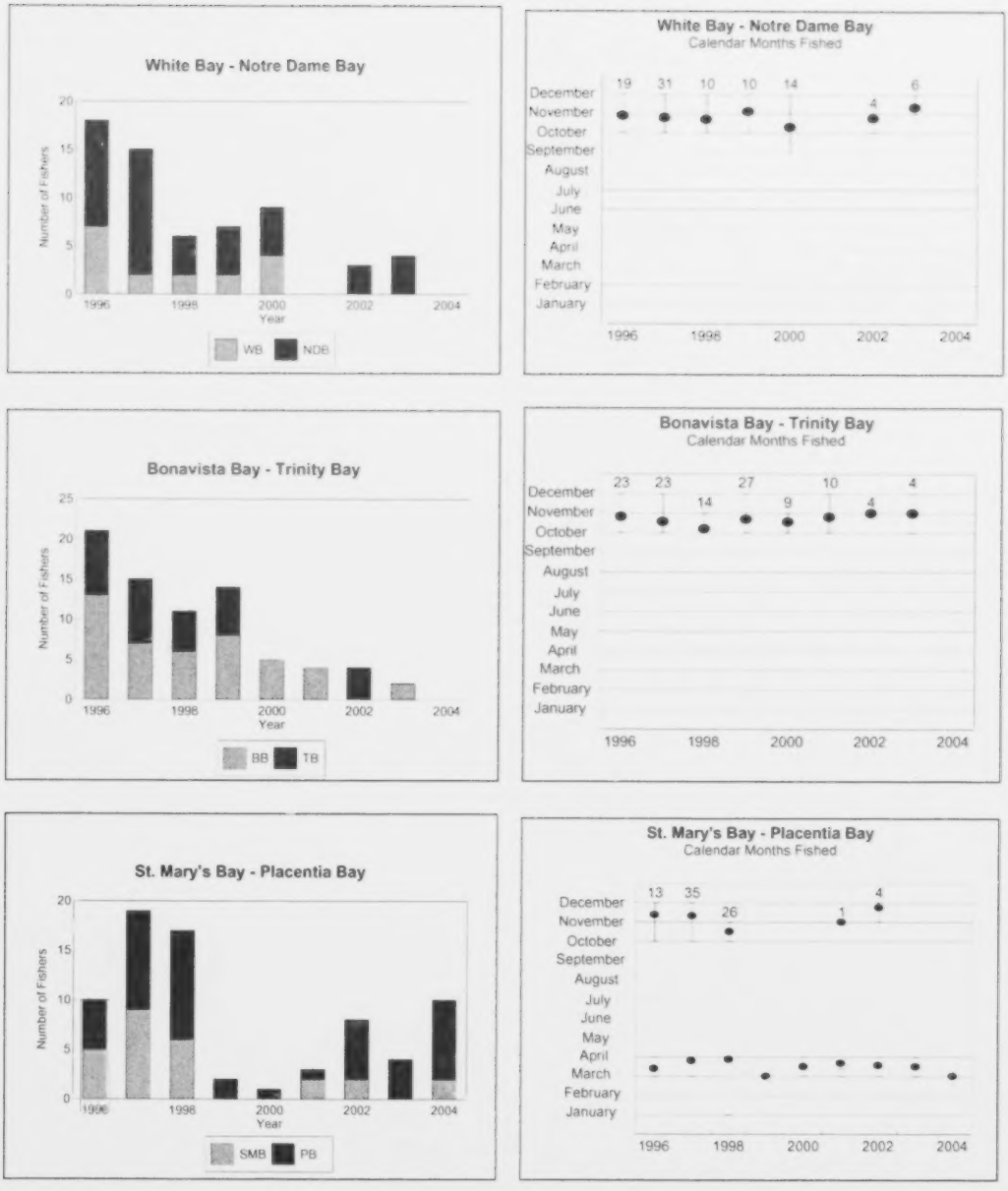
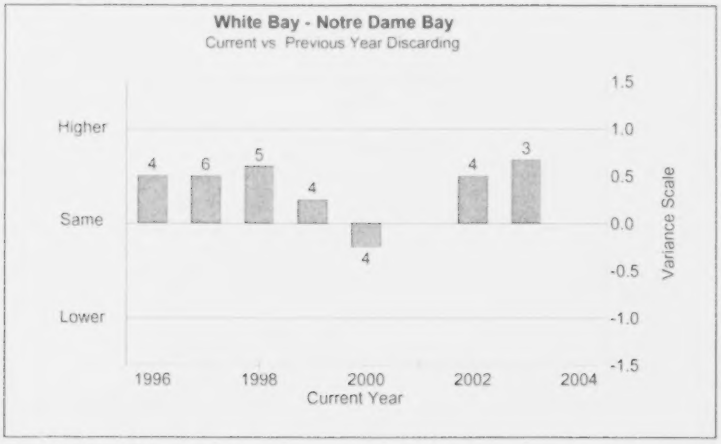
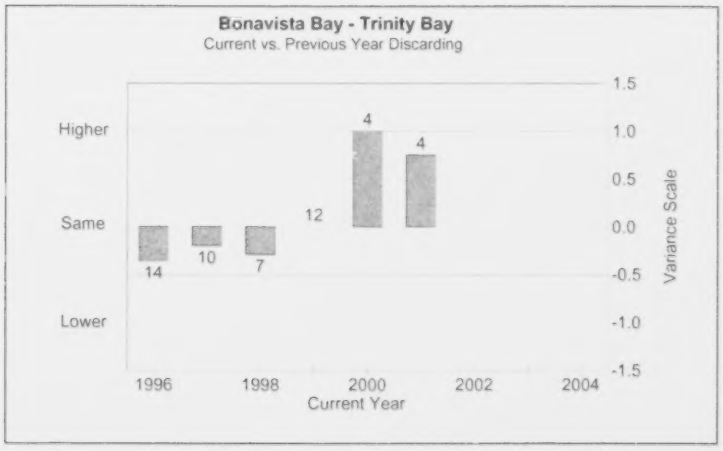


Figure 13. Number of purse seine fishers by bay (left panels) and calendar months fished (right panels). Solid circles (right panels) represent means, vertical bars represent the range of responses, and sample sizes are listed at the top.

White Bay - Notre Dame Bay
2002 Purse Seine Questionnaire
Locations of Successful Sets
Total Sets = 12
Successful Sets = 11
% Successful Sets = 91.7
% Successful Daytime Sets = 91.7
White Bay - Notre Dame Bay
2003 Purse Seine Questionnaire
Locations of Successful Sets
Total Sets = 8
Successful Sets = 8
% Successful Sets = 100.0
% Successful Daytime Sets = 100.0
St. Mary's Bay - Placentia Bay
2003 Purse Seine Questionnaire
Locations of Successful Sets
St. Mary's Bay - Placentia Bay
2004 Purse Seine Questionnaire
Locations of Successful Sets

Figure 14. Locations of successful commercial purse seine sets (sets in which herring were caught), by stock area, 2002 and 2003 (2003 and 2004 for SMB-PB).





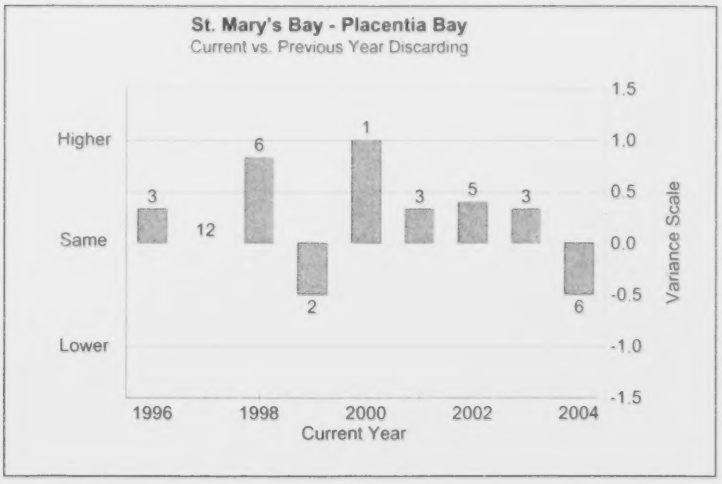


Figure 15. Observations on herring discards during the purse seine fishery in the current year compared to the previous year, by stock area, 1996 – 2003 (to 2004 for SMB-PB). Sample sizes are listed above each bar.

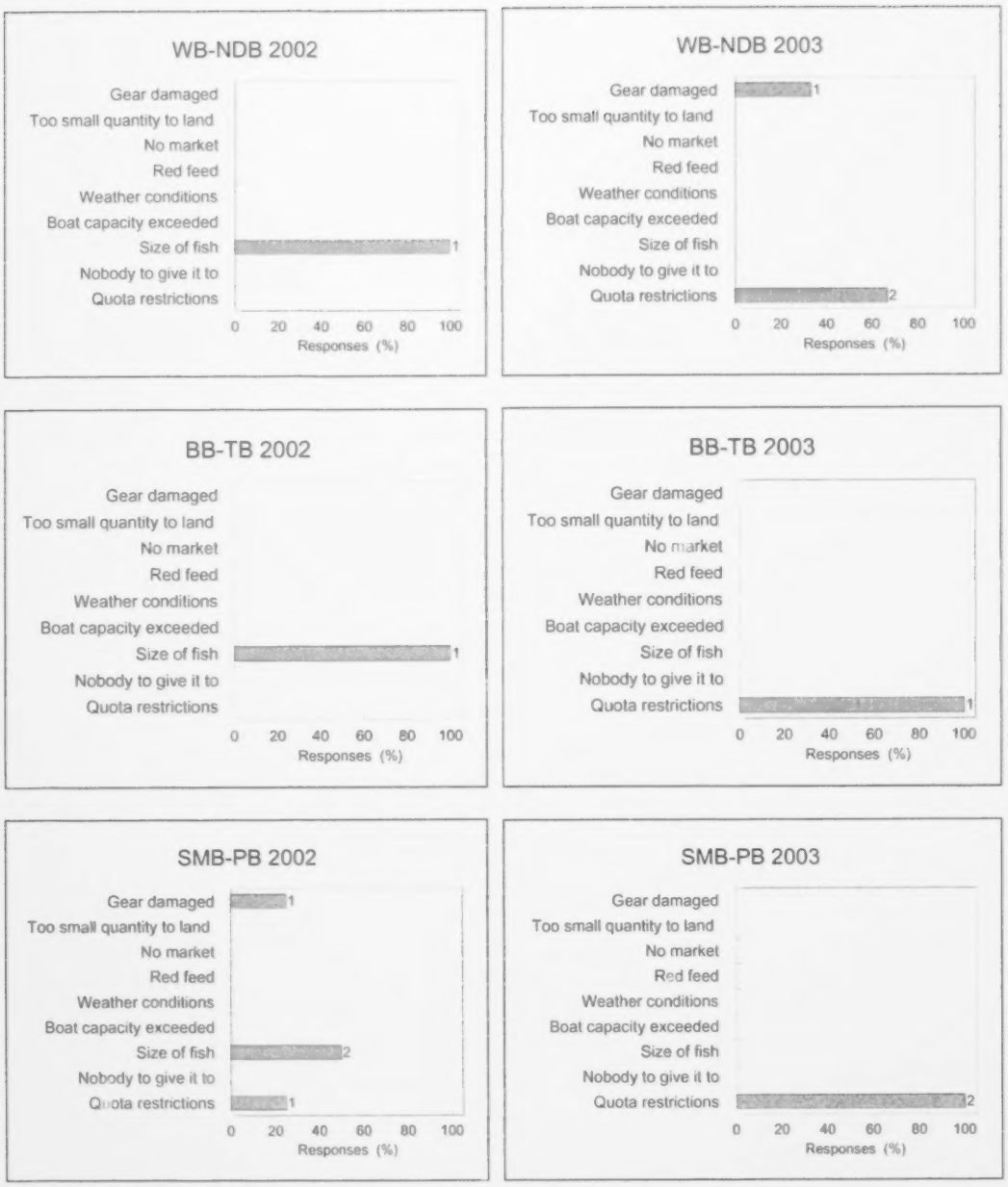


Figure 16. Reasons for discarding herring during the purse seine fishery, by stock area, 2002 and 2003.

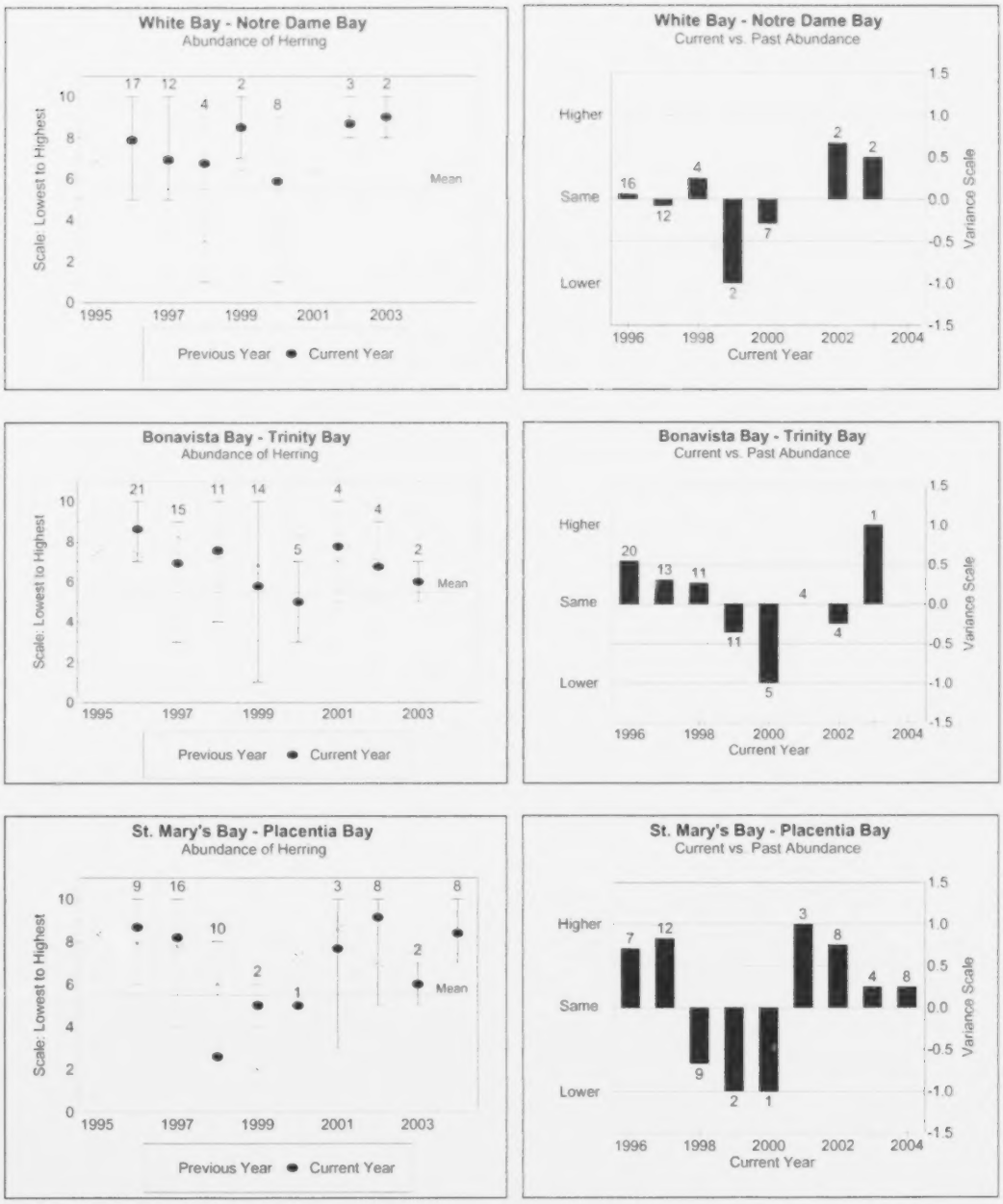
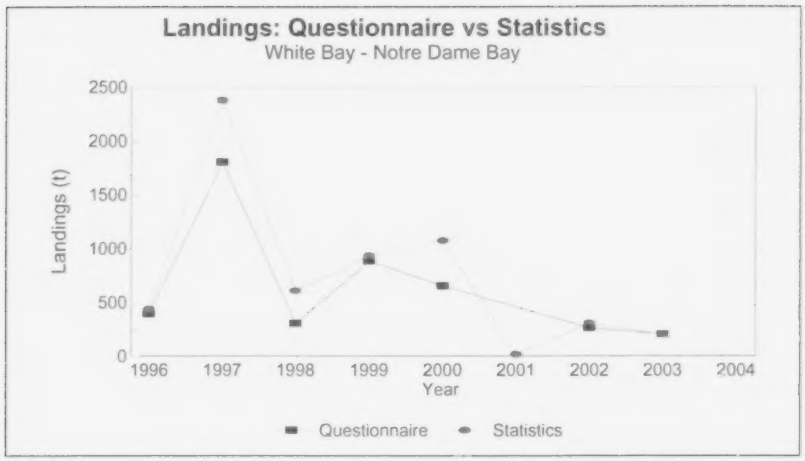
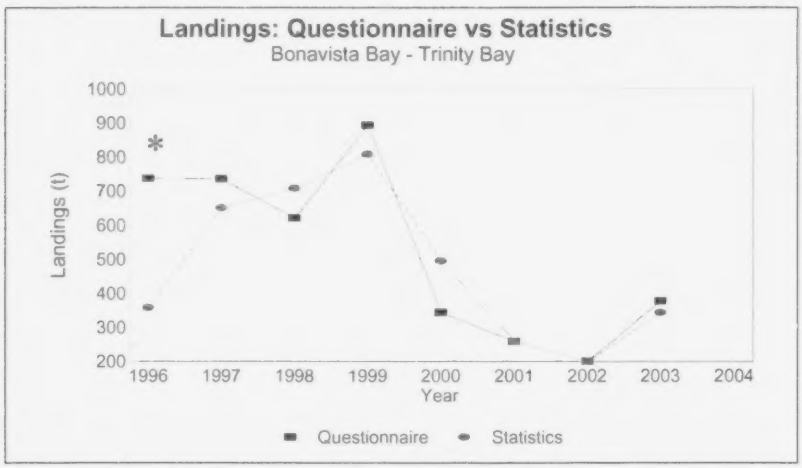


Figure 17. Purse seine fishers observations on herring abundance (left panels) compared to when they first started fishing herring (right panels). Solid circles represent means for the current year; x's represent means for the previous year as estimated during the current year. Vertical lines represent range of responses; sample sizes are listed above each vertical line and bar.





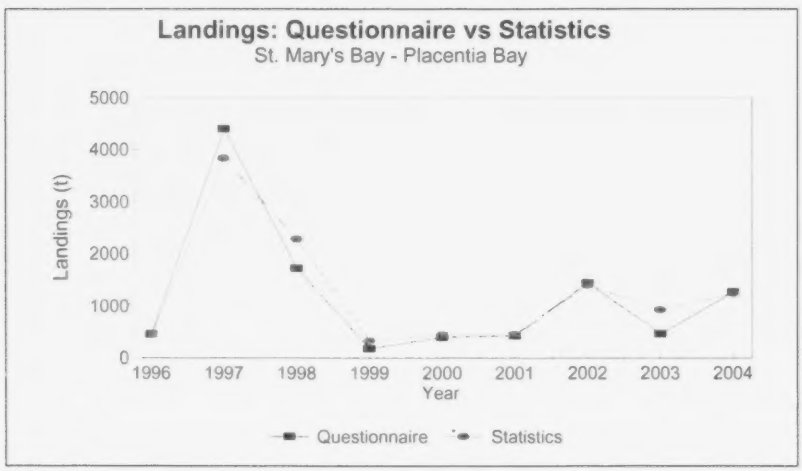


Figure 18. Comparison of reported landings (t) from purse seine questionnaires and from the commercial purse seine fishery, by stock area, 1996 – 2003 (to 2004 for SMB-PB).

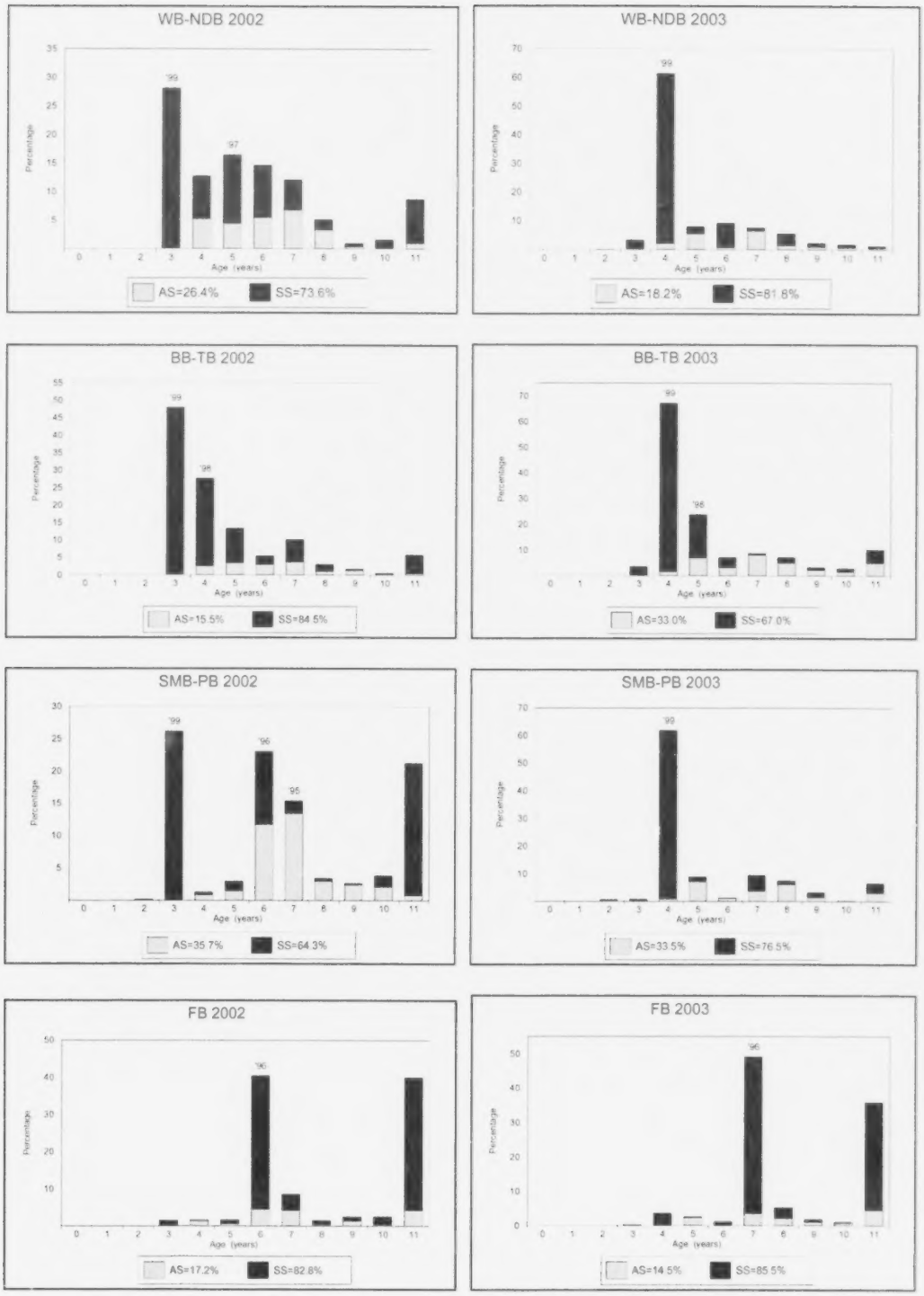


Figure 19. Age distribution of herring from the research gill net program, by stock area, 2002 and 2003.

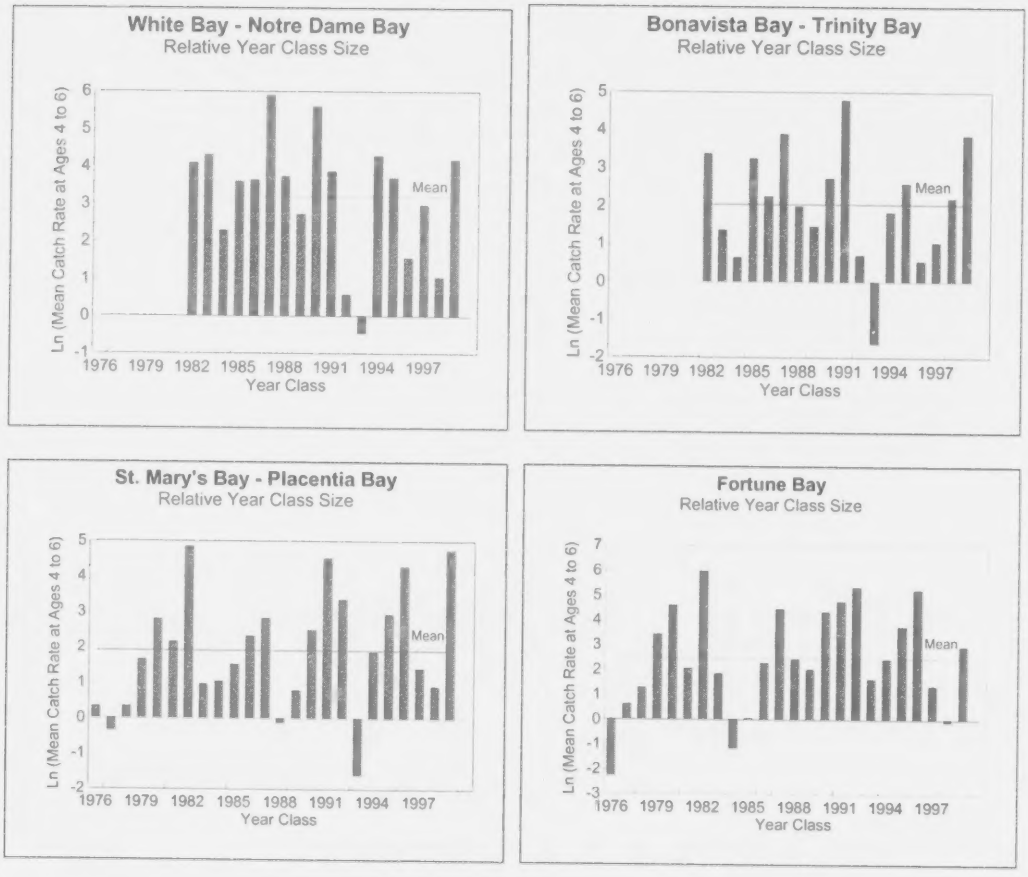

White Bay - Notre Dame Bay
Relative Year Class Size
Ln (Mean Catch Rate at Ages 4 to 6)
Mean
1976 1979 1982 1985 1988 1991 1994 1997
Year Class
Bonavista Bay - Trinity Bay
Relative Year Class Size
Ln (Mean Catch Rate at Ages 4 to 6)
Mean
1976 1979 1982 1985 1988 1991 1994 1997
Year Class
St. Mary's Bay - Placentia Bay
Relative Year Class Size
Ln (Mean Catch Rate at Ages 4 to 6)
Mean
1976 1979 1982 1985 1988 1991 1994 1997
Year Class
Fortune Bay
Relative Year Class Size
Ln (Mean Catch Rate at Ages 4 to 6)
Mean
1976 1979 1982 1985 1988 1991 1994 1997
Year Class

Figure 20. Relative year class sizes estimated from mean research gill net catch rates at ages 4, 5 and 6.

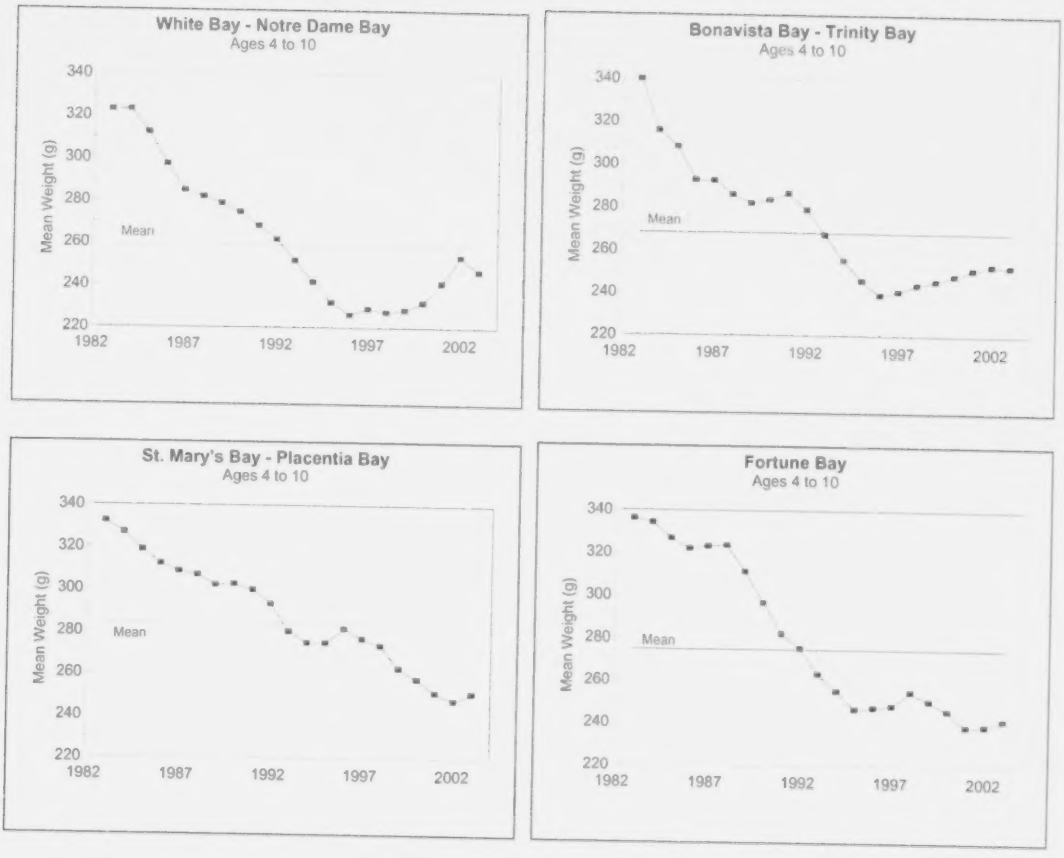


Figure 21. Mean weight (three year moving average) of spring spawning herring, ages 4 to 10, from samples collected January to June, by stock area, 1983 – 2003.

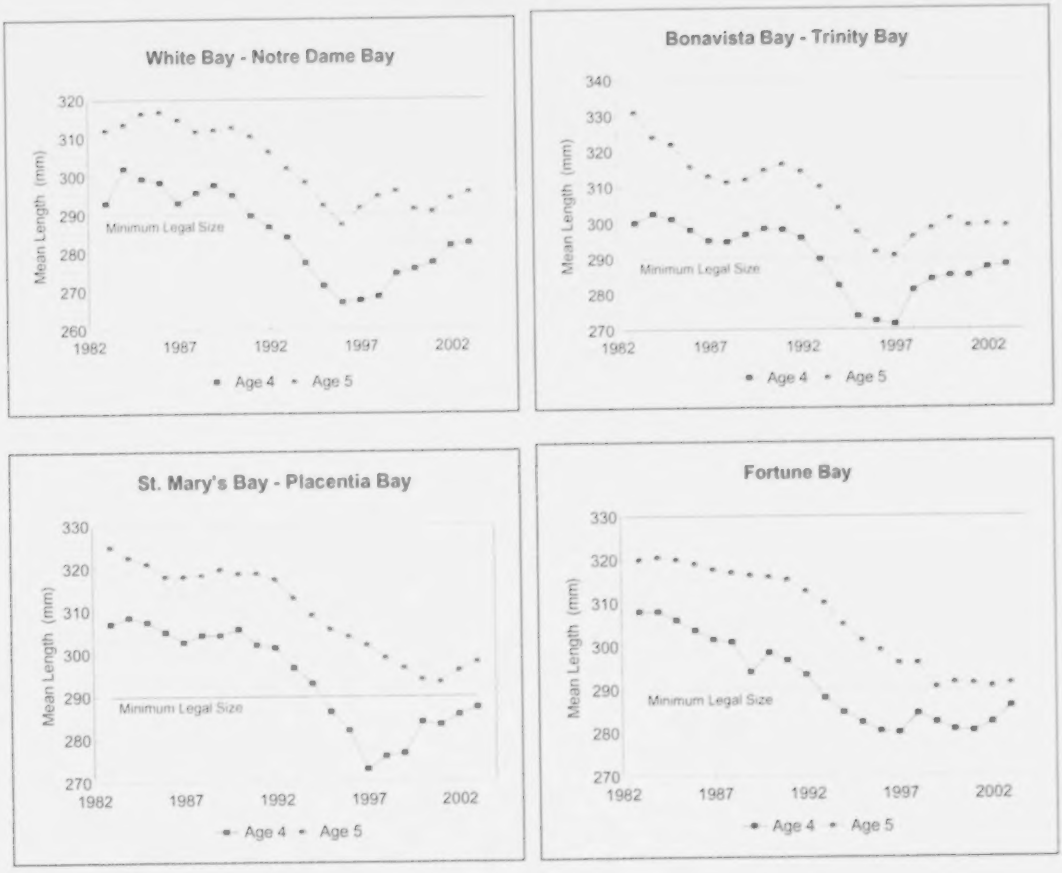
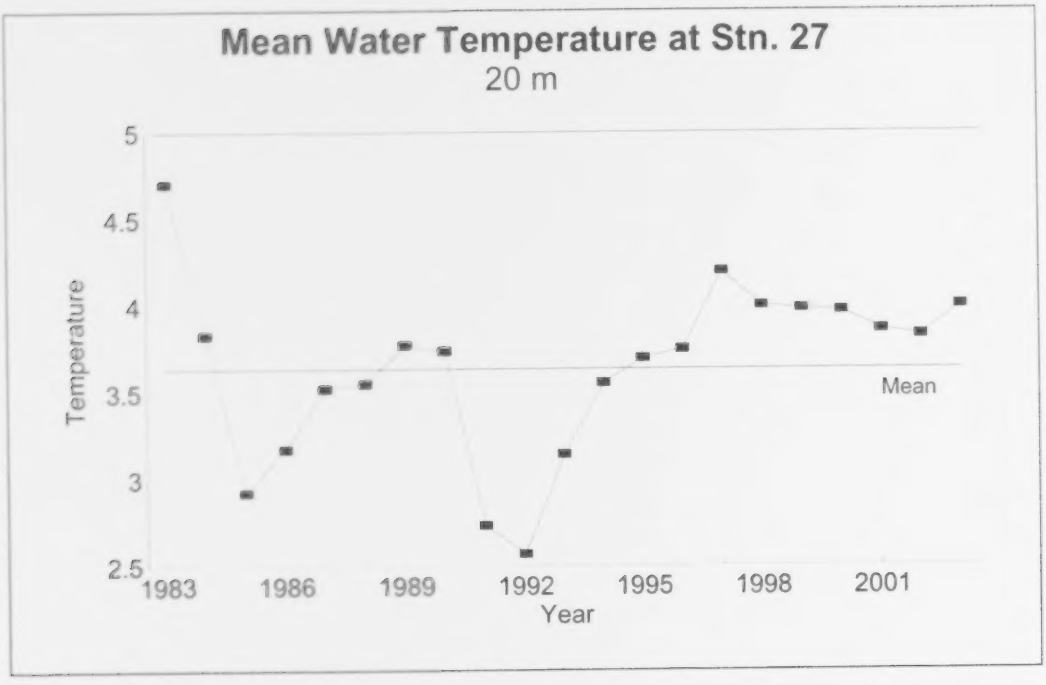


Figure 22. Mean lengths at ages 4 and 5 (three year moving average) of spring spawning herring, from samples collected January to June, by stock area, 1983 – 2003.



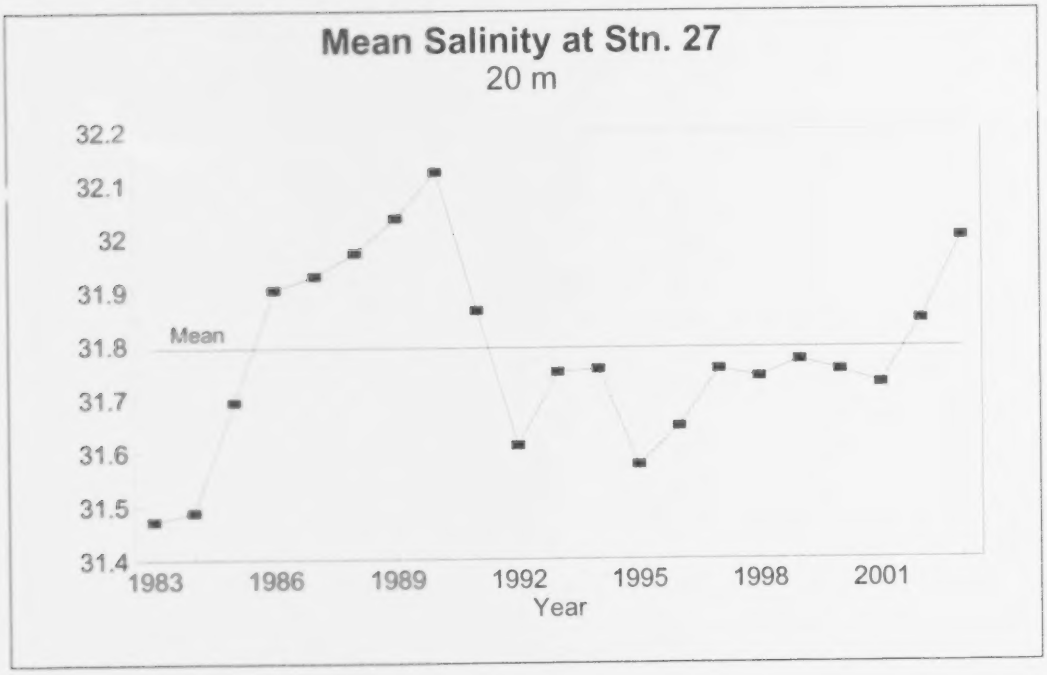


Figure 23. Mean water temperatures and salinities (two year moving average) at 20 m from Station 27 off St. John's, 1983 – 2003.

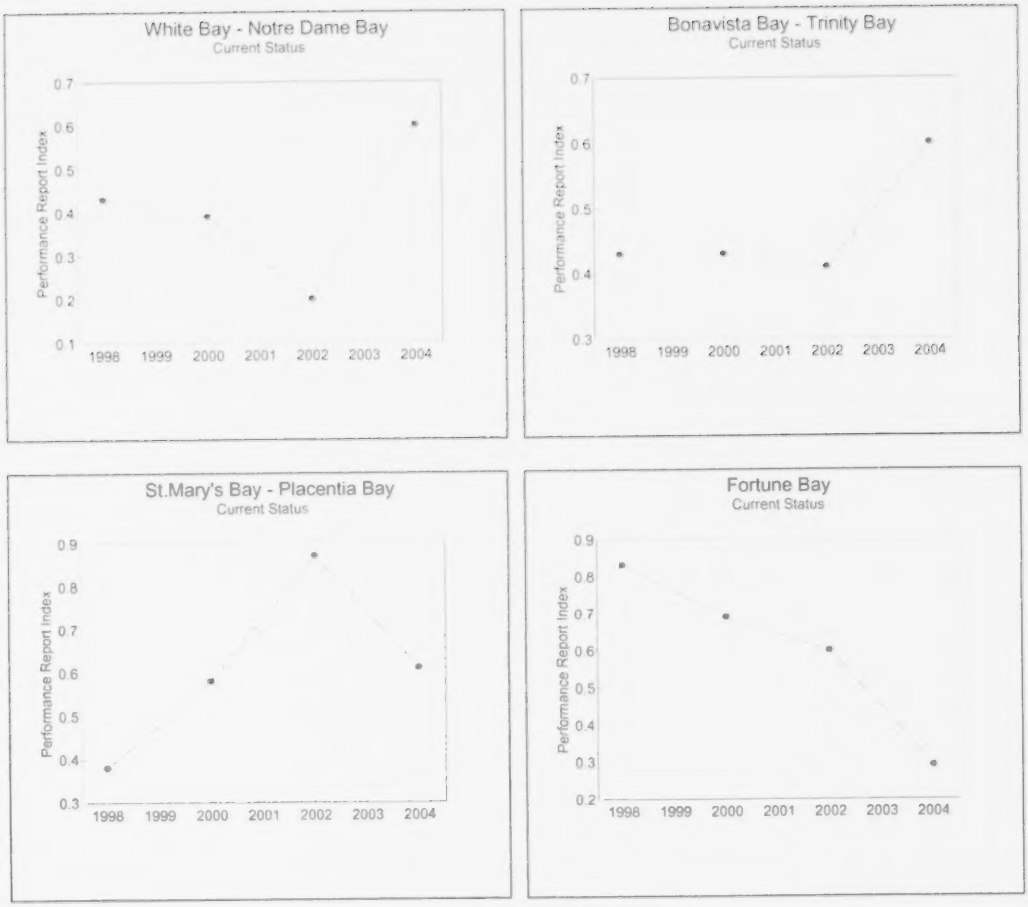


Figure 24. Weighted performance report indices of current status, by stock area, 1998 – 2004.